User Guide

10/100 Secure Network Interface Card

3CR990B-97
3CR990B-FX-97

10/100 Mbps PCI Secure Copper NIC
100 Mbps Secure Fiber NIC

http://www.3com.com/
http://esupport.3com.com

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Contents

1 Installing and Connecting the NIC

This user guide explains how to install the 3Com 10/100 Secure NIC (3CR990B NIC family) in a computer running any of the following operating systems:

- Windows 2003 Server
- Windows XP
- Windows 2000
- Windows NT 4.0
- Windows 98 SE
- NetWare 5.x and 6.x
- Linux 2.4

Your Windows operating system should have the latest service pack installed.

Minimum Installation Requirements

Your client computer or server must meet the following requirements before you can successfully install the 3CR990B NIC:

- Processor (client or server) — Intel Pentium or above
- Available bus-mastering PCI slot, conforming to PCI 32-bit specifications, revision 2.2
- CD-ROM drive

Installation Overview

Installing the NIC involves completing the following tasks:

- Registering the product
- Installing the NIC in the computer
- Connecting the NIC to the network
- Installing the network driver
- Enabling data encryption offloads

Safety Precautions

Observe the following safety precautions.

WARNING: Computers operate with voltages that can be lethal. Before removing the cover, turn off the computer and unplug it. Disconnect all cables that are connected to the main system unit. Remove jewelry from your hands and wrists. Use insulated or nonconductive tools.

CAUTION: The NIC is packed in an antistatic container to protect it during shipment. Do not touch the components or any metal parts on the NIC, except for the backplate. To avoid damaging the NIC or the computer, reduce static electricity on your body by wearing an electrostatic discharge wrist strap attached to the chassis or by touching an unpainted metal part of the chassis before unplugging the computer and before handling the NIC.

CAUTION: Install the NIC in a PCI slot that conforms to PCI 2.2 specifications. Do not attempt to install the NIC in an ISA or EISA slot. Doing so may damage the NIC and the computer.

WARNING: Make sure that the computer power cord is unplugged. Only properly trained and authorized personnel should perform service. Contact the computer manufacturer for information about safe service techniques.

Preparing the NIC and the Computer

After observing the safety precautions, follow these preparation steps:

1 Make sure that cable requirements are met.

3CR990B-97 NIC

The RJ-45 port on the 3CR990B-97 NIC provides a 10 Mbps or 100 Mbps connection automatically, depending on the speed of the connected hub or switch.

The following table shows the cable requirements and maximum network cable lengths for the 3CR990B-97 NIC:

Network Environment	Cable Required	Maximum Cable Length
10 Mbps (10BASE-T)	CAT 3, 4, or 5 unshielded twisted pair (UTP)	100 m (328 ft)
100 Mbps (100BASE-TX)	CAT 5 UTP	100 m (328 ft)

3CR990B-FX-97 NIC

The following table shows the cable requirements and maximum network cable lengths for the 3CR990B-FX-97 NIC:

Network Environment	Connector	Cable Required	Maximum Cable Length
100 Mbps (100BASE-FX)	SC	Long-wavelength fiber-optic (1300 nm):	
		50 µ/125 µ multimode fiber	Full-duplex: 2,000 m (6,560 ft) Half-duplex: 412 m (1,351 ft)
		62.5 µ/125 µ multimode fiber	Full-duplex 2,000 m (6,560 ft) Half-duplex 412 m (1,351 ft)

2 Unpack and inspect the NIC for damage.

3 Exit all open applications and user processes.

4 Turn off the power to the computer and attached devices.

5 Unplug the power cables from the power source.

6 Remove the computer cover.

7 Locate an empty, non-shared bus-mastering PCI slot and remove its slot cover. Save the screw, if there is one.

   Do not install the NIC in a shared PCI slot. Avoid any PCI slot next to an ISA slot. This slot is often shared and does not support bus mastering.

   If you do not know how to identify a PCI slot, check the computer documentation or ask the system administrator.

8 Write down the MAC address of the NIC and note the relative position of the intended PCI slot.

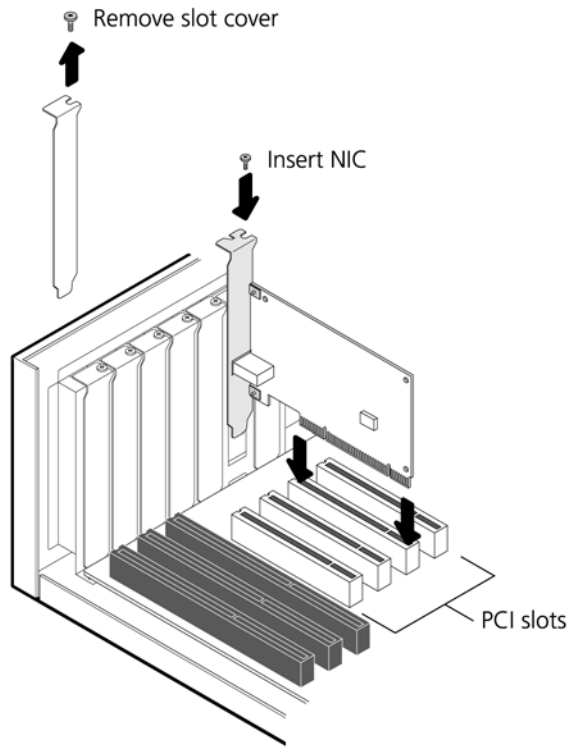
   The MAC address is the 12-digit hexadecimal number printed on the small bar code label on the component side of the NIC. This information is helpful when you are installing the network drivers and connecting the cables to the hub or switch.

   The next step is to install the NIC in the computer and connect it to the network, as described in the next section.

Installing and Connecting the NIC

Observe the safety precautions listed in "Safety Precautions" on page 2.

The following instructions apply to installing the NIC in most computers. If these instructions are not appropriate for your computer, refer to the documentation that accompanied the computer.



1 Carefully insert the NIC in the empty PCI slot, as shown in the previous illustration.

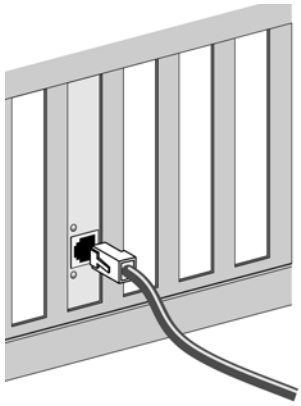
Press firmly to ensure that the NIC is fully seated in the slot. Secure the NIC with the screw if you removed one earlier.

2 Replace the computer cover and plug in the power cord. Do not turn on the power to the computer.

3 Connect the cable.

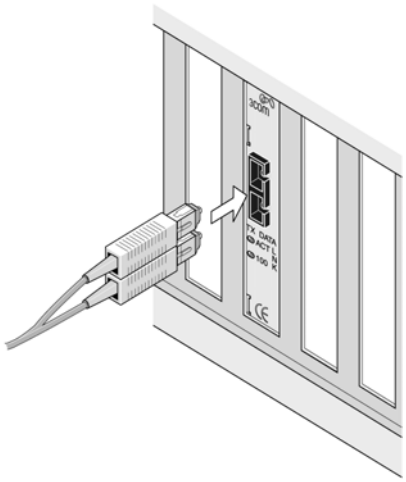
3CR990B-97 NIC

Plug the RJ-45 connector on the twisted-pair network cable into the RJ-45 port on the NIC backplate as shown in the following figure.



3CR990B-FX-97 NIC

Plug the network cable into the fiber port on the NIC backplate as shown in the following figure.



4 Connect the other end of the network cable to an active network port.

The next step is to install the software. Go to the appropriate chapter for your operating system.

NOTE: If your site network installation procedures require you to verify that installed hardware is functional before you install software, run the 3C99XCFG.EXE DOS diagnostics program before installing the driver. For more information, see "Using the 3Com DOS Configuration Program" on page 48.

2 Windows 2003 Server Driver Installation

This chapter explains the following tasks on a computer running Windows 2003 Server:

- Install the network driver and NIC software using the 3Com installation CD.
- Verify the network driver installation.

To obtain the latest version of a driver, go to:

http://www.3com.com/

Search for "3CR990B" and "drivers." The network driver can be used in both Microsoft and NetWare network environments.

Installing the Network Driver

To install the driver:

1. Make sure that the NIC is installed in the computer, as described in "Installing and Connecting the NIC" on page 3.
2. Turn on the power to the computer.
3. Insert the 3Com Installation CD in the CD-ROM drive.
   The 3Com Installation CD main menu appears.
4. Click *NIC Software*.
5. Click *NIC Drivers and Diagnostics*.
6. Click *Install NIC Driver*.
7. Select the type of installation:
   - *Install with Diagnostic Program*—installs the driver as well as the 3Com NIC Diagnostics Program for Windows. See "Using the 3Com NIC Diagnostics Program" on page 47 for more information.
   - *Install without Diagnostic Program*—installs the driver only.

   The driver installation begins.
8. Click *OK* when the 3Com NIC Driver Update Kit dialog box appears.
   The driver is installed.

Verifying the Network Driver Installation

To verify successful NIC installation:

1. Open the Windows *Start* menu, and then select *Control Panel*.
2. Double click *Network Connections*.
3. Check connections in the LAN or High-Speed Internet window.

3 Windows XP Driver Installation

This chapter explains the following tasks on a computer running Windows XP:

- Install the network driver and NIC software using the 3Com Installation CD.
- Verify the network driver installation.

To obtain the latest version of a driver, go to:

http://www.3com.com/

Search for "3CR990B" and "drivers." The network driver can be used in both Microsoft and NetWare network environments.

Installing the Network Driver

To install the driver:

1. Make sure that the NIC is installed in the computer, as described in "Installing and Connecting the NIC" on page 3.
2. Turn on the power to the computer.
3. Insert the 3Com Installation CD in the CD-ROM drive.
   The 3Com Installation CD main menu appears.
4. Click *NIC Software*.
5. Click *NIC Drivers and Diagnostics*.
6. Click *Install NIC Driver*.
7. Select the type of installation:
   - *Install with Diagnostic Program*—installs the driver as well as the 3Com NIC Diagnostics Program for Windows. See "Using the 3Com NIC Diagnostics Program" on page 47 for more information.
   - *Install without Diagnostic Program*—installs the driver only.

   The driver installation begins.
8. Click *OK* when the 3Com NIC Driver Update Kit dialog box appears.
   The driver is installed.

Verifying the Network Driver Installation

To verify successful NIC installation:

1. Open the Windows *Start* menu, and then select *Control Panel*.
2. Double click *Network Connections*.
3. Check connections in the LAN or High-Speed Internet window.

4 Windows 2000 Driver Installation

This chapter explains the following tasks on a computer running Windows 2000:

- Install the network driver and NIC software using the 3Com Installation CD.
- Verify the network driver installation.

To obtain the latest version of a driver, go to:

http://www.3com.com/

Search for "3CR990B" and "drivers." The network driver can be used in both Microsoft and NetWare network environments.

Installing the Network Driver

1. Make sure that the NIC is installed in the computer, as described in "Installing and Connecting the NIC" on page 3.
2. Turn on the power to the computer.
3. Insert the 3Com Installation CD in the CD-ROM drive.

   If the main menu appears, click *Exit*.

   Windows detects the NIC. The Found New Hardware Wizard starts.
4. Click *Next*.

   The Install Hardware Device Drivers screen appears.
5. Make sure *Search for a suitable driver for my device (recommended)* is selected, and then click *Next*.

   The Locate Driver Files screen appears.
6. Make sure *CD-ROM drives* is selected, and then click *Next*.

   The system detects the NIC. The Driver Files Search Results screen appears.
7. Click *Next*.

   The Completing the Found New Hardware Wizard screen appears with the name of the installed NIC.
8. Click *Finish*.

   The driver is installed.

Verifying the Network Driver Installation

To verify successful NIC installation:

1. Right-click *My Network Places* and select *Properties* from the menu.
2. Check connections in the Network and Dial-up Connections window.

5 Windows NT 4.0 Driver Installation

This chapter explains the following tasks on a computer running Windows NT 4.0:

- Install the network driver and NIC software using the 3Com Installation CD.
- Verify the network driver installation.

To obtain the latest version of a driver, go to:

http://www.3com.com/

Search for "3CR990B" and "drivers." The network driver can be used in both Microsoft and NetWare network environments.

Installing the Network Driver

Before you begin, make sure that:

- All installation requirements are met. See "Minimum Installation Requirements" on page 1.
- The NIC is installed. See "Installing and Connecting the NIC" on page 3.
- You have Network Administrator privileges.

To install the driver:

1. Turn on the power to the PC.
2. Double-click the My Computer icon, the Control Panel icon, and then the Network icon.
3. Select the Adapters tab.
4. Click *Add*.

   The Select Network Adapter dialog box appears.
5. Click *Have Disk*.

   The Insert Disk dialog box appears.
6. Insert the 3Com Installation CD in the CD-ROM drive.

   If the main menu appears, click *Exit*.
7. At the OEM Option dialog box, type in the path of the CD and then click *OK*.
8. Make sure the 3Com NIC is selected, and then click *OK*.

   If this is the first time setting up the network, Windows may prompt you to click *Next* to continue setting up the protocol and services.

   Files are copied. Windows may prompt you for the Windows NT specific files. These are typically located in C:\I386.
9. Click *OK* on any dialog boxes that may appear.

10 When the installation is complete, Windows prompts for a reboot. After the reboot, make sure to reapply the service pack.

NOTE: Verify that the Windows operating system has been upgraded to the latest version and latest service pack. Also, make sure the correct BIOS and firmware are installed to ensure the system works correctly.

NOTE: If networking has not been installed on your PC, Windows NT asks if you want to install networking. Click *Yes*, and then click *Select from Disk*. Go to step 5 to continue.

Verifying the Network Driver Installation

To verify successful NIC installation:

1 Double click the My Computer icon, the Control Panel icon, and then the Network icon.

2 Select the Adapters tab.

3 Make sure that the name of the NIC appears in the list of network adapters.

6 Windows 98 SE Driver Installation

This chapter explains the following tasks on a computer running Windows 98 SE:

- Install the network driver and NIC software using the 3Com Installation CD.
- Verify the network driver installation.

To obtain the latest version of a driver, go to:

http://www.3com.com/

Search for "3CR990B" and "drivers." The network driver can be used in both Microsoft and NetWare network environments.

Installing the Network Driver

To install the driver:

1. Make sure that the NIC is installed in the computer, as described in "Installing and Connecting the NIC" on page 3.
2. Turn on the power to the computer.
3. Insert the 3Com Installation CD in the CD-ROM drive.

   If the main menu appears, click *Exi*t.

   Windows detects the NIC. The Add New Hardware Wizard starts and detects a new Ethernet Controller.
4. Click *Nex*t.

   Windows prompts you to search for the best driver for your device.
5. Select *Search for the best driver for your device (Recommended)*, and then click *Next*.
6. Make sure *CD-ROM drive* is selected, and then click *Next*.

   Windows detects the driver.
7. Click *Next*.
8. Click *Finish*.

   The driver installation is complete.
9. Restart the computer.

Verifying the Network Driver Installation

To verify successful NIC installation:

1. Right-click *My Computer* and select *Properties*.
2. Click the Device Manager tab.

   The Device Manager window appears.
3. Scroll down the list of hardware devices to Network Adapters. Click the plus sign (+) to the left of the icon to display the list of NICs currently configured.
4. Make sure the 3Com NIC is installed and that there is not a red X or a yellow exclamation point (!) next to the device.

7 Novell NetWare Driver Installation

This chapter explains the following tasks on a computer running Novell NetWare 5.0, 6.0, and 6.5:

- Install the network driver and NIC software using the 3Com Installation CD.
- Verify the network driver installation.

To obtain the latest version of a driver, go to:

http://www.3com.com/

Search for "3CR990B" and "drivers." The network driver can be used in both Microsoft and NetWare network environments.

Installing the Driver in Novell NetWare Server 5.1 and 6.0

Before you begin, make sure that:

- The NIC is installed in the server.
- The latest support pack files are installed. The latest support packs can be found at: **http://support.novell.com/misc/patlst.htm**.

  To obtain the latest support pack files, go to the Novell support Web site and select the Minimum Patch List option in the navigation bar. Scroll down the page and select and download the latest support pack or patch file(s) for the operating system running on your server.

There are two methods for installing the driver:

- Installation during the Novell operating system installation.
- Installation when Novell is already installed.

NOTE: If you are installing NetWare 5.x or 6.x for the first time, you need to install the NIC driver during the operating system installation procedure.

Installation During Novell OS Installation

You may want to create an archive disk by copying all the files from the CD ROM NetWare directory onto a floppy disk. If you choose to use the CD directly, make sure that the CDROM.NLM file is loaded and that you are aware of the NetWare Volume name for the CD that you just installed.

1. When prompted for the network board, select the field and then press Enter.
2. Press Insert to specify a NIC.
3. Press Insert to specify an unlisted NIC.
4. Press Enter if the drivers are contained on a floppy disk, or press F3 and enter a different path.
5. Press Enter to select the NIC.
6. Select *Modify Driver Properties* to configure NIC options, or choose *Return to Driver Summary*.

Installation with Novell Already Installed

Be sure that the server has the latest support pack available installed. The latest support pack can be found at: **`http://support.novell.com/misc/patlst.htm`**

1. Insert the NIC into a PCI slot.
2. Go to system console on the server.
3. Run `nwconfig`.
4. Go to driver options, configure network drivers.
5. Choose *Select a driver*.
   a. Press Enter if the drivers are contained on a floppy disk, or
   b. Press F3 and enter the path of the drivers if they are not contained on a floppy disk.
6. Select *Yes* to copy the driver.
7. Enter the slot number of the NIC.
   For instructions on identifying the slot number, see the next section, "Identifying the Slot Number."
8. Configure the protocols as necessary.
9. Press F10 to save the parameters.
10. Select *Save parameters and load driver*.
    After the driver is loaded, you may continue to load other drivers if needed.

Identifying the Slot Number

If you do not know the slot number of the NIC you are installing, follow the instructions below to identify the slot number.

1. Press the Ctrl and Esc keys on your keyboard.
2. Go to system console.
3. At the system console, type **`Load 3C99X`** .
   This loads the driver.
4. At the system console, type **`config`** .
5. Look for the driver name of the 3Com NIC.
6. Note the slot number used by the NIC.
7. Type **`Unload 3C99X`** at the system console.
8. Press the Ctrl and Esc keys on your keyboard.
9. Go to `nwconfig` .

Verifying or Modifying NIC Parameters

When a NIC configuration is saved, the NetWare install program adds `load` and `bind` statements to the autoexec.ncf file. By accessing this file, you can verify the parameters configured for each NIC, modify them, or enter additional parameters.

A valid autoexec.ncf file is shown below. One set of `load` and `bind` commands is shown for each frame type the NIC is configured to support.

```
set Time Zone = PST8PDT
set Daylight Savings Time Offset = 1
set Start Of Daylight Savings Time = (APRIL SUNDAY FIRST 2:00:00
AM)
set End Of Daylight Savings Time = (OCTOBER SUNDAY LAST 2:00:00
AM)
set Default Time Server Type = SINGLE
set Bindery Context = O=LAN
# WARNING!
file server name NOVELLSERVER
# WARNING!
# If you change the name of this server, you must update
# all the licenses that are assigned to this server. Using
# NWAdmin, double-click a license object and click
# Certificate Assignments. If the old name of
# this server appears, you must delete it and then add the
# new server name. Do this for all license objects.
ServerID 1C8EE2C
LOAD ODINEB.NLM
LOAD TCPIP LOAD 3c99x SLOT=2 FRAME=Ethernet_802.2
NAME=3c99x_1_E82
BIND IPX 3c99x_1_E82 NET=FAFD3D25
LOAD 3c99x SLOT=2 FRAME=Ethernet_802.3 NAME=3c99x_1_E83
BIND IPX 3c99x_1_E83 NET=5A2D8D6D
LOAD 3c99x SLOT=2 FRAME=Ethernet_SNAP NAME=3c99x_1_ESP
BIND IPX 3c99x_1_ESP NET=477A35BD
LOAD 3c99x SLOT=2 FRAME=Ethernet_II NAME=3c99x_1_EII
BIND IPX 3c99x_1_EII NET=C3C8F2E4
BIND IP 3c99x_1_EII ADDR=172.16.1.1 MASK=ff.ff.ff.0
mount all
SEARCH ADD SYS:\JAVA\BIN
SEARCH ADD SYS:\JAVA\NWGFX
```

NOTE: The Novell monitor program and the config command are also useful for verifying driver configuration. For information on how to use these programs, see the Utilities Reference in your Novell NetWare online documentation.

NOTE: If you modify any NIC parameters, you must reboot the system before the changes will take effect. If you make changes and do not reboot, you may experience configuration problems. If the driver was loaded at console, however, no reboot is necessary.

Removing Drivers from Autoexec.ncf

To remove the drivers from the autoexec.ncf file, locate the `load` and `bind` command lines and remark them out by inserting the `#` symbol at the beginning of each command line.

Example:

```
# LOAD 3c99x SLOT=2 FRAME=Ethernet_802.2 NAME=3c99x_1_E82
# BIND IPX 3c99x_1_E82 NET=FAFD3D25
# LOAD 3c99x SLOT=2 FRAME=Ethernet_802.3 NAME=3c99x_1_E83
# BIND IPX 3c99x_1_E83 NET=5A2D8D6D
# LOAD 3c99x SLOT=2 FRAME=Ethernet_SNAP NAME=3c99x_1_ESP
# BIND IPX 3c99x_1_ESP NET=477A35BD
# LOAD 3c99x SLOT=2 FRAME=Ethernet_II NAME=3c99x_1_EII
# BIND IPX 3c99x_1_EII NET=C3C8F2E4
# BIND IP 3c99x_1_EII ADDR=172.16.1.1 MASK=ff.ff.ff.0
```

Installing the Driver in Novell NetWare Server 6.5

Before you begin, make sure that:

- The NIC is installed in the server.
- The latest support pack files are installed. The latest support packs can be found at: **`http://support.novell.com/misc/patlst.htm`**.

  To obtain the latest support pack files, go to the Novell support Web site and select the Minimum Patch List option in the navigation bar. Scroll down the page and select and download the latest support pack or patch file(s) for the operating system running on your server.

There are two methods for installing the driver:

- Installation during the Novell operating system installation.
- Installation when Novell is already installed.

NOTE: If you are installing NetWare 5.x or 6.x for the first time, you need to install the NIC driver during the operating system installation procedure.

Installation During Novell OS Installation

You may want to create an archive disk by copying all the files from the CD ROM NetWare Server (nwserver) directory onto a floppy disk. If you choose to use the CD directly, make sure that the CDROM.NLM file is loaded and that you are aware of the NetWare Volume name for the CD that you just installed.

1. During the operating system installation, NetWare attempts to load the built-in driver for the NIC. The following message appears: "The following driver instance failed to load and will be deleted." Select *Yes* to return to the summary screen.
2. Select the network field.
3. Press Insert to specify an unlisted NIC.
4. Press Enter if the drivers are contained on a floppy disk, or press F3 and enter a different path.
5. Press Enter to select the NIC.
6. Select *Modify Driver Properties* to configure NIC options, or choose *Return to Driver Summary*.

Installation with Novell Already Installed

Be sure that the server has the latest support pack available installed. The latest support pack can be found at: **`http://support.novell.com/misc/patlst.htm`**

1. Insert the NIC into a PCI slot.
2. Boot the computer.

   During boot time, the operating system tries to automatically detect the NIC.
3. Go to the HWdetect screen.

   NetWare attempts to load the built-in driver for the NIC. The following message appears: "The following driver instance failed to load and will be deleted."
4. Press Enter.
5. Select the network board option.
6. Select *Modify* and highlight the 3c99x.lan entry.

7. Press the delete key to remove the built-in driver.
8. Press Insert to specify an unlisted NIC.
9. Press Enter if the drivers are contained on a floppy disk, or press F3 and enter a different path.
10. Press Enter to select the NIC.
11. Select *Modify Driver Properties* to configure NIC options, or choose *Return to Driver Summary*.

8 Linux 2.4 Driver Installation

This chapter explains how to install the network driver on a computer running Linux 2.4.

To obtain the latest version of a driver, go to:

http://www.3com.com/

Search for "3CR990B" and "drivers." The network driver can be used in both Microsoft and NetWare network environments.

Installing the Network Driver

To install the driver:

NOTE: Before installing the driver, make sure you are logged in as root (SuperUser).

1. Make sure that the NIC is installed in the computer, as described in "Installing and Connecting the NIC" on page 3.
2. Make sure that the kernel source is installed in /usr/src/linux or /usr/src/linux-2.4.
3. Copy the file /Linux/3c990.tar.gz from the 3Com Installation CD to your hard drive.
   a. Create a directory to mount the CD-ROM into (if it does not exist):
   ```
   mkdir /mnt/cdrom
   ```
   b. Mount the CD-ROM using the following command:
   ```
   mount /dev/cdrom /mnt/cdrom
   ```
   c. Copy the driver to a temporary directory:
   ```
   mkdir /tmp/3c990
   cp /mnt/cdrom/Linux/* /tmp/3c990
   ```
4. Unpack the driver:
   ```
   cd /tmp/3c990
   tar zxvf 3c990.tar.gz
   ```
5. Compile the driver:
   ```
   cd /tmp/3c990/3c990
   make
   ```
6. Load the driver:
   ```
   make load
   ```
   Depending on your configuration, the operating system may automatically start the interface and request an address from a DHCP server. If it does not, start the interface using the following command:
   ```
   ifconfig eth0 up
   ```
   You may have to substitute '**eth0**' for your actual interface if you have more than one Ethernet NIC installed.

9 Installing and Configuring Data Encryption Offloads

The 3CR990B NIC performs data encryption processing offloads in Windows 2003, Windows XP, and Windows 2000.

The 3CR990B NIC does not encrypt the data itself: the operating system performs that function.

Encryption processing is handled entirely by the NIC. The NIC enables true end-to-end network security at the data capacity of the connected network cable, without sacrificing performance.

This chapter provides instructions for configuring IPSec in Windows 2003, Windows XP, and Windows 2000 environments.

Overview

Internet Protocol Security (IPSec) is a framework of open standards for ensuring secure private communications over IP networks. IPSec ensures confidentiality, integrity, access control, and authenticity of data communications across a public IP network.

Offloading Encryption Processing

You can configure any two (or more) computers running Windows 2003, Windows XP, or Windows 2000 to perform IPSec encryption by changing the Local Security Setting in the operating system.

With most non-3CR990B NICs, all the IPSec processing is done by the host central processing unit (CPU), which significantly diminishes CPU performance. The 3CR990B NIC can *offload* all the encryption processing from the host CPU, thereby freeing the CPU to work on other tasks.

Selecting Basic or Strong Encryption Processing

The 3CR990B NIC provides Data Encryption Standard (DES) 56-bit encryption processing and 3DES (3DES 168-bit) encryption processing. You can configure the 3CR990B NIC to process data packets encrypted with either DES (basic) or 3DES (strong) algorithms. DES and 3DES are IPSec bulk encryption algorithms for coding data.

DES encrypts 64-bit data blocks using a 56-bit key. DES can be applied in several modes. 3DES (Triple DES) achieves a higher level of security by encrypting the data three times using DES with three different, unrelated keys. 3DES is also known as 168-bit data encryption.

Configuring IPSec in Windows 2003, Windows XP, and Windows 2000

The 3CR990B NIC accelerates IP security (IPSec) data encryption from supported operating systems that provide this offload capability. This feature is currently available in the Windows 2003, Windows XP, and Windows 2000 operating systems.

IPSec primarily consists of two parts:

- encryption/decryption
- authentication

To send or receive encrypted data with a 3CR990B NIC installed, you must first create a *security policy*, and then enable encryption on the NIC. The security policy establishes and defines how encrypted network traffic between your computer and a specified server occurs.

Authentication enables the receiver to verify the sender of a packet by adding key fields to a packet without altering the packet data content.

The following table shows the available levels of encryption:

Encryption Type	Encryption Level	Description
AH	Medium	Authentication only
ESP	High	Authentication and encryption
Custom	Varies	Provides encryption and an extra authentication that includes the IP header. Custom allows you to select options for both AH and ESP, such as MD%/SHA-1 and DES/3DES. And you can select the rate at which new keys are negotiated. Microsoft uses IKE key exchange to renew keys every x seconds or y bytes. However, this practice is computationally very high in overhead. Some users may set these values low and have frequent key updates. Users more concerned with performance will set these values higher. For more information, refer to the Microsoft documentation about creating IPSec flows.

Creating a Security Policy

The process you use to create and enable a security policy depends on your network environment requirements. The following is an example of one approach to creating a security policy.

NOTE: You must complete all of the sequences in this section to establish and enable a security policy for transmitting and receiving encrypted data over the network.

Defining the Console

This sequence establishes the Console and defines its parameters.

To define the Console:

1. In the Windows taskbar, click *Start*, *Programs*, *Accessories*, and then *Command Prompt*.
2. At the DOS prompt, enter:

   MMC

   The Console1 screen appears.
3. In the menu click *Console*, and then *Add/Remove Snap-in*.

   The Add/Remove Snap-in screen appears.
4. Click *Add*.

   The Add Standalone Snap-in screen appears.
5. Select *IP Security Policy Management*, and then click *Add*.

   The Select which computer this Snap-in will manage screen appears.
6. Enable the *Local computer* option.
7. Click *Finish*, *Close*, and then *OK*.

Creating the Policy

This sequence creates and names the new security policy.

The Console1 and Console Root screen appears with *IP Security Policies on Local Machine* displayed in the list.

1. In the left pane, click *IP Security Policies on Local Machine*.
2. Right-click inside the right pane below the list items.
3. From the pop-up menu, select *Create IP Security Policy*.

   The IP Security Policy Wizard starts.
4. Click *Next*.

   The IP Security Policy Name screen appears.
5. Enter a name for the new security policy that you are creating. You can enter a description to help you identify this policy.
6. Click *Next*.

   The Requests for Secure Communication screen appears.
7. Clear the *Activate the default response rule* check box.
8. Click *Next* and then *Finish*.

   A screen appears with the name of the new security policy in the title bar.
9. Click *Add*.

   The Security Rule Wizard starts.
10. Click *Next*.

    The Tunnel Endpoint screen appears.
11. Enable the default option *This rule does not specify a tunnel*, and then click *Next*.

    The Network Type screen appears.

12 Enable the default option *All network connections*, and then click *Next*.
The Authentication Methods screen appears.

13 Enable the *Use this string to protect the key exchange (preshared key):* option, type the appropriate string text in the entry field, and then click *Next*.

Creating a Filter

This sequence creates a filter for the policy.

The IP Filter List screen appears.

1 Click *Add*.
A new IP Filter List screen appears.

2 Enter a name for the filter, and then click *Add*.
The IP Filter Wizard starts.

3 Click *Next*.
The IP Traffic Source screen appears.

4 Click *Next*.
The IP Traffic Destination screen appears.

5 Select *A Specific IP Address* in the pull-down list.
The IP Address entry box appears on the IP Traffic Destination screen.

6 Enter destination IP address, and then click *Next*.
The IP Protocol Type screen appears.

7 Accept the default, and then click *Next*.

8 Click *Finish* to close the IP Filter Wizard.

9 Click *Close* to close the IP Filter List screen.

Binding the Filter

This sequence attaches the new filter to the policy.

The IP Filter List screen appears.

1 Enable the option for the new filter name and make sure that the new filter name is selected.

2 Click *Next*.

Creating the Filter Action

This sequence defines how the filter acts on the policy.

The Filter Action screen appears.

1 Click *Add*.
The Filter Action Wizard starts.

2 Click *Next*.
The Filter Action Name screen appears.

3 Enter a name (for example: 3DES to the Server), and then click *Next*.
The Filter Action General Options screen appears.

4 Accept the default, and then click *Next*.
The screen, Communicating with computers that do not support IPsec, appears.

5 Accept the default value, and then click *Next*.

The IP Traffic Security screen appears.

6 Select *Custom*, and then click *Settings*.

The Custom Security Method Settings screen appears.

7 Enable the *Data integrity and encryption (ESP):* check box, and then make the appropriate selections in the Integrity and algorithms list boxes.

8 Click *OK*, *Next*, and then *Finish*.

Binding the Filter Action

This sequence attaches the new filter action to the filter and policy.

The Filter Action screen appears.

1 Enable the filter action option and make sure that the filter name is selected. (In this example, we used the filter name: *3DES to the Server.*)

2 Click *Next*, *Finish*, and then *Close*.

The newly created policy appears in the right pane of the Console Root\IP Security Policies on Local Machine screen.

3 Exit this screen and, when prompted, save the new policy information. Use a meaningful name for future reference.

You can modify this security policy by double clicking the icon that is created when you save the policy in the previous step.

Enabling Encryption

An encryption policy must exist in the Console Root\IP Security Policies on the Local Machine screen before you can enable encryption on the 3CR990B NIC.

To enable encryption:

1 Right-click the desired policy icon in the right pane of the screen.

2 Select *Assign*.

3 A green plus (+) symbol appears on the policy icon to indicate that encryption is toggled on.

Disabling Encryption

An encryption policy must exist in the Console Root\IP Security Policies on the Local Machine screen, and be enabled, before you can disable encryption on the 3CR990B NIC.

To disable encryption:

1 Right-click the desired policy icon in the right pane of the screen.

2 Select *Un-assign*.

The absence of a green plus (+) symbol on the policy icon indicates that encryption is toggled off.

10 Installing 3Com Advanced Server Features for Windows

This chapter explains the following tasks for a computer running Windows 2003, Windows XP, Windows 2000, or Windows NT 4.0 with the 3Com 10/100 Secure (3CR990B) NIC installed.

NOTE: Windows 98 does not support the advanced server features.

Sections include:

- About the Advanced Server Features
- Installing 3Com Advanced Server software for a server NIC
- Configuring groups and VLANs for a server NIC

3Com Advanced Server *(*Dynamic*Access)* features include:

- Fault tolerance
- Bi-directional load balancing
- Resilient server links (RSL)
- Multiple virtual LANs (MVLANs) support

About the Advanced Server Features

The 3CR990B NIC and accompanying software provide a variety of features that relieve network congestion and ensure high performance and maximum bandwidth availability.

NOTE: Only system administrators should configure these settings.

3Com Dynamic*Access* Advanced Server Features

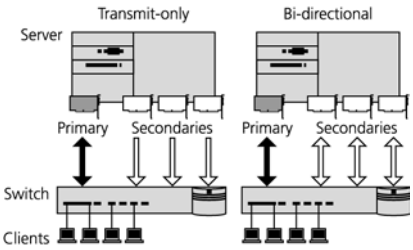
3Com Dynamic*Access* Advanced Server software adds intelligence to the NIC to improve network performance, management, and control. Advanced server features relieve network congestion and ensure high performance and maximum bandwidth availability.

- Load Balancing groups share the network load over resilient server links (RSLs) that keep traffic flowing even if a NIC in a group is temporarily disconnected.
- Failover fault tolerance provides a backup solution in the event of a NIC failure.
- VLANs (IEEE 802.1Q multiple virtual LANs) let you divide network segments into logical partitions that simplify configuration changes, organize work groups efficiently, help to control traffic, and provide extra security.

Load Balancing

Load balancing maximizes bandwidth at the server through the use of multiple parallel resilient server links (RSLs) that share the network load as shown in the next figure.

An RSL consists of two or more NICs that form a *virtual NIC*. Each virtual NIC has multiple physical NICs bound to it, forming a *group*. Each NIC in a group uses the same protocols and frame types. One NIC is designated the *primary* NIC and the others *secondary* NICs.



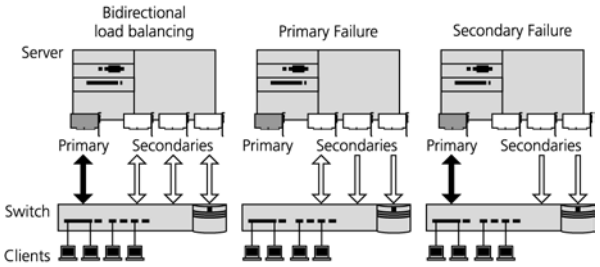
Failover

In addition to load balancing, RSLs provide failover fault tolerance between a server and a switch—if one NIC in a group fails, the others assume the network load of the failed NIC.

The failover behavior of secondary NICs depends on how you set load balancing:

- In a *transmit* load balancing arrangement, the primary NIC is the only one that receives packets. If the primary NIC fails, a secondary NIC assumes the configuration profile, network traffic, and active status of the failed primary NIC.
- In a *bidirectional* load balancing arrangement, all NICs receive packets. If any NIC fails, receive load balancing is disabled, and the other NICs continue transmit-only load balancing activity. Receive load balancing is restored when new connections are established with clients.

If the primary NIC fails, a secondary NIC takes over packet reception for the group. Bidirectional load balancing is restored after a failure when applications create new connections and new clients log in as illustrated in the following figure.



VLANs

A virtual LAN (VLAN) is a group of location-independent and topology-independent devices that communicate as if they were on the same physical LAN. Network devices on different LAN segments and of different media types can be members of the same VLAN.

Membership in a VLAN is determined by a VLAN tag that is transmitted with the Ethernet frame for use by a switch.

With VLANs, you can define a network according to:

- Organizational groups—For example, you can have one VLAN for the Marketing department and one for the Finance department.
- Application groups—For example, you can have one VLAN for e-mail users and one for multimedia users.

Implementing VLANs on a network has these advantages:

- It eases the change and movement of devices on IP networks.

  With traditional IP networks, if users move to a different IP subnet, the IP addresses of each workstation must be updated manually. With VLANs installed, if an end station on VLAN 1 is moved to a port elsewhere on the network, you need only to specify that the new port is on VLAN 1.
- It helps to control traffic.

  With traditional networks, congestion can be caused by broadcast traffic that is directed to all network devices whether they require it or not. Each VLAN can be set up to contain only those devices that need to communicate with each other, increasing network efficiency.
- It provides extra security.

  Devices within each VLAN can communicate only with member devices in the same VLAN. If a device in VLAN 1 needs to communicate with devices in VLAN 2, the traffic must cross a router.

The 3CR990B NIC multiple VLAN capability supports IEEE 802.1Q VLAN tagging and works with any switch that complies with IEEE 802.1Q specifications. Refer to your Ethernet switch documentation for more information on IEEE 802.1Q VLANs.

Server Features Using Other NICs

Up to two *foreign NICs* (those that are not 3Com server NICs) are allowed in one group per server. For guidelines on using foreign NICs, see "Planning the Configuration" on page 33.

Installing 3Com Advanced Server Software

Follow these steps to install 3Com Advanced Server *(*Dynamic*Access)* software:

1. Make sure that the NIC and the network driver are properly installed in your computer.
2. Start Windows.
3. Insert the 3Com Installation CD in the CD-ROM drive.

   The Welcome screen appears.
4. Click *NIC Software*.
5. Click Dynamic*Access technologies*.
6. Click *Install DynamicAccess software.*
7. Select the appropriate menu option for your operating system.

   The 3Com Dynamic*Access* Software Installation screen appears, displaying the following prompt:

   "Do you wish to install Dynamic*Access* Software for Servers?"
8. Click *Yes*.

   The 3Com Advanced Server Software Installation program starts.
   - When 3Com Advanced Server features are installed for Windows NT, NICs bind to the Advanced Server protocol and real protocols bind to the Advanced Server Miniport. Do not modify these bindings.
   - When 3Com Advanced Server features are installed for Windows 2003, Windows XP, or Windows 2000, LAN connections bind to the Advanced Server protocol and real protocols bind to the Advanced Server miniport. Do not modify these bindings.
9. When the 3Com Advanced Server Technology installation is finished, exit the installation CD, and then exit Windows.
10. Restart the computer.

NOTE: You must restart the computer to complete the installation.

Verifying the Installation

After the 3Com Advanced Server software is installed on the server, the following changes are visible in the Windows Network control panel:

- For each physical NIC installed in the client computer, a virtual NIC entry appears in the list of network adapters.
- All protocols are re-bound to the virtual NIC. The bindings to the physical NIC are still intact.
- A 3Com Dynamic*Access* entry appears as a protocol.
- A 3Com Dynamic*Access* icon is installed in the Windows Control Panel (for Windows NT 4.0 installations only).

Configuring Groups and VLANs

3Com Advanced Server technology features allow you to configure load balancing groups and virtual LANs (VLANs).

The following 3Com Advanced Server technology features are available for NIC groups in Windows:

- Load balancing
- RSL failover
- Multiple VLANs

The examples in this section illustrate typical actions you might take in the course of maintaining a 3Com Advanced Server configuration in Windows.

Planning the Configuration

Consider these items when planning groups and VLANs:

- Decide whether you want to use bidirectional load balancing or transmit load balancing.

  To use bidirectional load balancing, you must assign a dedicated IP address for each load balancing group. This address must be unique (not used elsewhere on the network). For details, see "Specifying a Dedicated IP Address" on page 36.
- Decide which NICs are to be part of each group. Each group must include at least two NICs.
- Decide whether you want to use a foreign (non-3Com) NIC in one of the groups.

  Up to two foreign NICs (that is, NICs that are not 3Com server NICs) are allowed in one group per server.
- Decide which NIC is to be the primary NIC in each group. If a foreign NIC is used, it must be designated the primary NIC.
- Disable load balancing if you have set failover for a group of NICs operating at different speeds. 3Com Advanced Server supports failover for a group of NICs operating at different speeds (for example, with one NIC operating at 10 Mbps, another operating at 100 Mbps, and another at 1,000 Mbps). However, Advanced Server supports load balancing only for a group of NICs operating at the same speed (with all NICs operating at 10 Mbps, or all operating at 100 Mbps, or all at 1000 Mbps). For example, if you specify failover from a 3Com Gigabit Server 1000 PCI NIC to a 3Com 10/100 PCI NIC, you must disable load balancing for that group to achieve the best performance.
- For the best failover performance, turn the spanning tree feature off at switches that are connected directly to the server. If the spanning tree feature is turned on, a failover may be delayed up to 30 seconds while the switch processes the spanning tree algorithm.
- Plan the cable changes required to connect each primary NIC and all secondary NICs to the same network segment.
- Observe the recommended support limit of four groups per server.

- The following guidelines apply to groups under Windows 2003, Windows XP, and Windows 2000:

  802.1p Support Property—The value of the Windows 802.1p support property must be the same for all NICs in a group. For example, if this property is enabled for the primary NIC, it must also be enabled for all other NICs in the group.

  Microsoft Task Offload Support—It is possible to form a group of NICs that have different levels of support for Microsoft Task Offload features (TCP Checksum, TCP Segmentation, and IPSec). In this case, the offload support is limited to the features supported by all NICs in the group. For example, if two NICs in a group support all offload features but one NIC supports only TCP Checksum, then offload support for the group is limited to TCP Checksum.

- Observe these VLAN configuration guidelines:
  - Assign a VLAN ID number to each VLAN. If you are not using a DHCP server, each VLAN that is using IP services requires an IP address and subnet mask.

    3Com Advanced Server software supports as many as 16 VLANs per server.
  - Each VLAN bound to TCP/IP must exist on a separate IP subnet. DHCP servers used to allocate IP addresses must be located on the same IP subnets as the VLANs.
  - Each VLAN bound to the IPX/SPX protocol must use a unique network number.
  - To avoid problems associated with blocked multicast streams, configure end stations that support the IEEE 802.1p GARP Multicast Registration Protocol specification (GMRP) on separate switch segments from stations that do not support it.
  - Under Windows 2003 and Windows 2000, when VLANs are enabled, the Windows 802.1p Support property must be disabled for all the underlying miniports.
  - The following memory requirements are for multiple VLAN configurations. You can improve overall system performance with VLANs by increasing the physical RAM, the virtual memory page size, or both.

Number of VLANs	Minimum RAM Size (MB)
Up to 16	128

CAUTION: Before creating or removing a load balancing group or VLAN, take note of configuration information such as IP addresses and IPX network numbers. 3Com Advanced Server software does not restore a network configuration to its pre-Advanced Server state. Always verify that the network configuration conforms to your expectations after creating or removing a load balancing group or VLAN.

Working With Server Features

The 3Com Advanced Server features window contains tabs for these windows:

- In the Load Balance/RSL window, you can create and change Load Balancing/RSL groups. The NICs in a group work together to route traffic efficiently and to recover from failures.
- In the VLANs window, you can set up virtual LANs. All groups listed on the Load Balance/RSL window also appear as groups in the VLAN window. Any ungrouped NICs in the Load Balance/RSL window are also listed in the VLAN window.

Windows 2003, Windows XP, and Windows 2000

Access 3Com Advanced Server server features through the Windows Network and Dial-up Connections window as follows:

1. Log in to Windows with administrator privileges.
2. Launch the Windows Network and Dial-up Connections window.
3. Select a Local Area Connection icon.
4. Click the right mouse button and select *Properties*.
   The Local Area Connections Properties window appears.
5. Click the General tab.
6. In the General window, select Dynamic*Access* Protocol and click *Properties*.
   The Dynamic*Access* Protocol Properties window appears. Click the appropriate tab to configure server features.

Windows NT

Start 3Com Advanced Server features under Windows NT as follows:

1. Log in to the Windows NT Administrator account.
2. From the Windows *Start* menu, select *Settings/Control Panel*.
3. Double-click the Dynamic*Access* SW Server icon.
   The Dynamic*Access* Resilient Server Link/Load Balance/VLAN Configuration window appears. Click the appropriate tab to configure server features.

Creating a Group

1. Click the Load Balance/RSL tab.
2. In the Load Balance/RSL window, click *Create Group*.
3. In the Create Group dialog box, type a group name.
4. Set the load balancing:
   To enable transmit load balancing—Clear the *Receive Load Balance Enabled* check box and check the *Transmit Load Balance Enabled* box.
   To enable bidirectional load balancing—Check both the *Transmit Load Balance Enabled* box and the *Receive Load Balance Enabled* box. Enter only the Host ID bytes required for a dedicated IP address. For example:

<table>
<tr><th></th><th>Byte 1</th><th>Byte 2</th><th>Byte 3</th><th>Byte 4</th></tr>
<tr><td rowspan="2">Class A</td><td>Network ID</td><td colspan="3">Host ID</td></tr>
<tr><td></td><td>24</td><td>1</td><td>253</td></tr>
<tr><td rowspan="2">Class B</td><td colspan="2">Network ID</td><td colspan="2">Host ID</td></tr>
<tr><td colspan="2"></td><td>2</td><td>253</td></tr>
<tr><td rowspan="2">Class C</td><td colspan="3">Network ID</td><td>Host ID</td></tr>
<tr><td colspan="3"></td><td>253</td></tr>
</table>

See "Specifying a Dedicated IP Address" on page 36 for more information on the dedicated IP address.

To disable all load balancing—Clear the *Receive Load Balance Enabled* and the *Transmit Load Balance Enabled* check boxes.

5 Click *OK*.

The name of the new NIC group appears in the Load Balancing/RSL Groups list box.

Adding NICs to a Group

1 Click the Load Balance/RSL tab.

2 In the Load Balance/RSL window:

- Select a group from the Load Balancing/RSL Groups list.
- Select a NIC from the Network Interface Cards list.

3 Click *Add NIC*.

The NIC appears as part of the group in the Load Balancing/RSL list box.

If you click *Add NIC* repeatedly, NICs are added to the group in the order that they are listed after the first NIC you selected.

Specifying a Dedicated IP Address

Bidirectional load balancing requires that you specify a dedicated IP address for the load balancing group. This address specifies a Network ID and a Host ID, and it must be unique (not used elsewhere on the network). For example:

	Byte 1	Byte 2	Byte 3	Byte 4
Class A	Network ID	Host ID		
	125	24	1	253
Class B	Network ID		Host ID	
	139	25	2	253
Class C	Network ID			Host ID
	193	26	3	253

You can specify the dedicated IP address in the Create Group or Group Properties dialog boxes. You cannot specify the bytes for the Network ID; they are fixed. Specify the bytes for the Host ID for various classes of subnets as follows:

Class	Byte 1	Specify only bytes
A	126	2, 3, and 4 (the three rightmost boxes).
B	128 - 191	3 and 4 (the two rightmost boxes).
C	192 - 223	4 (the rightmost box).

Changing an IP Address

If another device is using a bidirectional load balancing group's dedicated IP address, you must change either the other device's IP address or that of the load balancing group. Use the appropriate procedure below:

Changing the Other Device's IP Address	After you change the other device's address, restart receive load balancing as follows: **1** In the Load Balancing/RSL window, select the group that had the duplicate address. **2** Click *Properties*. **3** In the Properties dialog box, click *OK*. **4** In the Load Balancing/RSL window, click *OK* to exit the window and restart Windows.
Changing the Group's Dedicated IP Address	**1** In the Load Balancing/RSL window, select the group that has the duplicate address. **2** Click *Properties*. **3** In the Properties dialog box, enter a new IP address and click *OK*. **4** In the Load Balancing/RSL window, click *OK* to exit the window and restart Windows.

Creating a VLAN

1 Click the VLANs tab.

2 In the VLANs window, select a NIC or group from the VLANs list and click *Create VLAN*.

3 In the VLAN ID dialog box, type a VLAN ID number and click *OK*.

Valid VLAN ID numbers are from 1 – 511 and from 768 – 4095. Numbers in the range 512 – 767 are reserved.

The new VLAN is added to the VLANs list.

Windows 2003/Windows XP/Windows 2000—If you create more than one VLAN, assign a VLAN ID number to each VLAN as follows:

- Right-click My Network Places and select *Properties* from the menu.
- In the next window, right-click a VLAN and select *Properties* from the menu.
- Click *Configure*.
- In the NIC Properties window, click *TCP/IP*.
- In the next window, configure the IP address and subnet mask.

Windows NT—Restart the computer when the software prompts you to do so.

Specifying Traffic Priorities

You can use the Dynamic*Access* Software Setup window to specify traffic priorities.

1 Double-click the 3Com Dynamic*Access* icon in the Windows Control Panel.

The Dynamic*Access* Software Setup window appears.

2 Click the Administration tab.

3 Set 3Com Advanced Server control panel access, set VLAN options, and enable efficient multicast control.

Saving the Configuration

To save and exit, click *OK*.

To exit without saving the configuration, click *Cancel*.

Disabling Load Balancing for a Group

Follow these steps to disable load balancing for a group:

1. Click the Load Balance/RSL tab.
2. In the Load Balance/RSL window:
   - Select a group from the Load Balancing/RSL Groups list.
   - Click *Properties*.
3. In the Group Properties dialog box:

   To disable receive load balancing only—Clear the *Receive Load Balance Enabled* check box.

   To disable all load balancing—Clear the *Receive Load Balance Enabled* and the *Transmit Load Balance Enabled* check boxes.
4. Click *OK*.

Changing the Primary NIC

The first NIC added to an empty group is automatically designated the *primary NIC*. NICs added subsequently are designated as *secondary* NICs. If a foreign (non-3Com) NIC is used, it must be designated the primary NIC. Primary status is indicated by a P icon at the beginning of the NIC name.

When there are more than one NIC in a group, you can change the primary NIC as follows:

1. Click the Load Balance/RSL tab.
2. In the Load Balance/RSL window, select a secondary NIC from the Load Balance/RSL Groups list.
3. Click *Select Primary*.

Removing a NIC from a Group

Follow these steps to remove a NIC from a group:

1. Click the Load Balance/RSL tab.
2. In the Load Balance/RSL window, select a NIC from a group in the Load Balancing/RSL Groups list.
3. Click *Remove NIC*.

Deleting or Editing a VLAN

When a VLAN is selected, you can delete it or edit its properties.

1. Click the VLANs tab.
2. In the VLANs window, select a VLAN.

   To delete the selected VLAN, click *Delete VLAN*.

   To edit the VLAN ID for the selected VLAN, click *Edit VLAN*.

Displaying NIC Properties

Follow these steps to display NIC properties:

1. Click the Load Balance/RSL tab.
2. In the Load Balance/RSL window, select a NIC.
3. Click *Properties*.
   The NIC Properties window appears, showing the properties of the selected NIC.

Displaying Group Properties

Follow these steps to display group properties:

1. Click the Load Balance/RSL tab.
2. In the Load Balance/RSL window, select a group in the Load Balancing/RSL Groups list box.
3. Click *Properties*.
   The Group Properties window appears, showing the properties of the selected group.

Troubleshooting a Load Balancing Configuration

Use the troubleshooting tips in the following table to solve problems that may occur in a load balancing configuration.

NOTE: To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:

`http://knowledgebase.3com.com`

Symptom	Tip
Receive load balancing fails to begin functioning.	Check the Group Properties to verify that the dedicated IP address has been entered. If no address appears in the Group Properties dialog box, enter one to enable receive load balancing.
Receive load balancing stops functioning.	Cables may be disconnected, or there may be other hardware problems. Reconnect or change the cables. Correct any other hardware problems. Bidirectional load balancing is restored after this type of failure when applications create new connections or new clients log in.
Reconnecting cables does not restore load balancing.	Check the event log for a duplicate IP address. If another device is using a load balancing group's dedicated IP address, change one of the IP addresses. See "Changing an IP Address" on page 37 for instructions.
Receive load balancing does not function across a router.	Receive load balancing across a router is not supported. Clients across the router cannot use receive load balancing, but clients within the subnet get higher throughput from receive load balancing.

Changing Windows 2003, Windows XP, and Windows 2000 Property Settings

If you receive warnings about inconsistent property settings (for example, the 802.1p Support property) while creating a group, use the following procedure to change a NIC property:

1. Right-click the My Computer icon and select *Properties* from the menu.
2. Click the Hardware tab, then click *Device Manager*.
3. Double-click *Network Adapters*.
4. Right-click on the name of the appropriate NIC and select *Properties* from the menu.
5. Click the Advanced tab.
6. Select the appropriate property from the list (for example, 802.1p Support).
7. Use the scroll list to change the property value.
8. Exit the Device Manager.

Identifying Windows 2003 and Windows 2000 Miniport and LAN Connections

3Com Advanced Server miniport connections and NIC Local Area Connections are listed in the Network and Dial-up Connections window. If a group or VLAN is associated with a miniport, the group name and VLAN name appear in the miniport icon name. If a miniport is associated with an ungrouped NIC, you can identify the NIC by its MAC address as follows:

1. In the Network and Dial-up Connections window, right-click the miniport icon and select *Properties* from the menu.
2. In the Dynamic*Access* Properties window, click the General tab.
3. In the General tab, move the cursor over the miniport name. (Do not click the name.)
   After a short pause, the MAC address of the associated NIC appears in a pop-up window.

Using Windows 2003, Windows XP, and Windows 2000 Offload Features

The 3CR990B NIC supports Windows 2003, Windows XP, and Windows 2000 offload features in an IP environment. The offload features are designed to enhance the Windows 2003 and Windows 2000 operating system capabilities by off-loading key TCP/IP networking and security tasks from the operating system:

- IPSec Offload—reduces CPU utilization by allowing the NIC and a crypto chip on the NIC to perform data encryption operations.
- TCP Segmentation Offload—reduces CPU utilization by allowing the NIC to perform segmentation of TCP packets.

NOTE: Windows 2003 and Windows 2000 do not allow IPSec offloads and TCP Segmentation offloads for the same session. Though all offload types may be enabled, TCP Segmentation offloading will not occur during an IPSec session.

- IP and TCP Checksum Offload—reduced CPU utilization by allowing the NIC to perform the checksum calculation of TCP/IP and UDP/IP packets.
- 802.1p Packet Priority Offload—reduces CPU utilization by allowing the NIC to perform the insertion of the 802.1Q tag header into the packet.

Enabling Offloads

Windows 2003 and Windows 2000 provide the capability to individually enable or disable each of the four offload features. (The default setting for these features is *enabled*.)

To enable or disable individual offload settings in Windows 2003 or Windows 2000:

1. Right-click the My Network Places desktop icon and select *Properties*.
   The Network and Dial-up Connections screen appears.
2. Right-click the Local Area Connection icon and select *Properties*.
   The Local Area Connection Properties screen appears.
3. Click *Configure*.
   The 3Com 10/100 Mbps Secure NIC screen appears.
4. Click the Advanced tab.
5. Select *Enable Offloads* in the Property list box.
6. Select the appropriate value in the Value entry box (shown in the following table) for the desired offload state.
7. Close all open windows.
   The following table describes values for the offload functions:

Value	Offload Function Enables
All Offloads Disabled	No offloads
cksum	TCP Checksum
cksum-ipsec	TCP Checksum and IPSec
cksum-tcpseg	TCP Checksum and TCP Segmentation
cksum-tcpseg-ipsec	TCP Checksum and TCP Segmentation and IPSec
ipsec	IP Sec
tcpseg	TCP Segmentation
tcpseg-ipsec	TCP Segmentation and IPSec
802.1p	Packet Priority
802.1p-cksum	Packet Priority and TCP Checksum
802.1p-cksum-ipsec	Packet Priority and TCP Checksum and IPSec
802.1p-cksum-tcpseg	Packet Priority and TCP Checksum and TCP Segmentation
802.1p-cksum-tcpseg-ipsec	Packet Priority and TCP Checksum and TCP Segmentation and IPSec
802.1p-ipsec	Packet Priority and IPSec
802.1p-tcpseg	Packet Priority and TCP Segmentation
802.1p-tcpseg-ipsec	Packet Priority and TCP Segmentation and IPSec

Configuring Offloads for a Group of Different NICs

Your computer may contain a combination of installed NICs (including one or more 3CR990Bs with varying offload capabilities). If you have a mix of dissimilar NICs configured in a group, then 3Com Dynamic*Access* Advanced Server software supports only those offload functions that are supported by all the NICs in the group.

For example, if you have created a group consisting of a 3CR990B NIC and another NIC that does not have any offload capabilities, then the group will not support any offloads.

In another example, if you have a group of three NICs with two supporting TCP Checksum, TCP Segmentation, and IPSec offloads, and one supporting only IPSec, then the group will support only IPSec offloads.

If you add a NIC to an existing group, and that NIC has offload capabilities that differ from those of the group, then you must reconfigure the group: that is, you must delete the group, recreate the group, and restart the computer. (If you do not delete and recreate the group, the Advanced Server software will not bind to the NIC.)

Similarly, if you replace a NIC that has been configured as part of a group with another NIC that has different offload capabilities, then you must reconfigure the group.

In addition, if you disable or enable any offloads for a group through the Windows 2003/ Windows 2000 Advanced tab, then you must reconfigure the group.

11 Configuring the NIC

This chapter describes how to configure the 3Com 10/100 Secure (3CR990B) NIC.

NOTE: Before you change the NIC configuration settings, contact your system administrator.

Default NIC Settings

The table below lists the configuration settings for the NIC. The default setting is shown in bold in the Settings column.

Option	Description	Settings
NetBoot ROM	Provides the ability to boot a computer over the network. Enables or disables the Netboot ROM (if a boot ROM is installed on the NIC).	• **Disabled** • Enabled
Duplex	Determines if the NIC transmits data across the network in both directions simultaneously (full-duplex) or in one direction at a time (half-duplex). • *Auto Select* allows the NIC to automatically connect at the duplex mode of the connected hub or switch. When you select this setting, the *Media Type* is automatically set to *Auto Select*. • *Full-Duplex* sets the NIC to operate in full-duplex mode. To use this setting, the switch that you are connected to must support full-duplex. You must also manually set the NIC *Media Type* setting. • *Half-Duplex* sets the NIC to operate in half-duplex mode. You must also set the NIC *Media Type* setting. **Note**: If you are running Windows 2003, Windows XP, or Windows 2000, changes made to the Duplex setting though the 3Com NIC Diagnostics are not reflected in the registry unless you also change the Media Select property setting in Windows: **1** In the Device Manager window, double-click *Network adapters*. **2** Right-click the 3CR990B NIC and select *Properties*. **3** Select the Advanced tab. **4** Select *Media Select* in the property list, and make the appropriate setting change in the Value list.	• **Auto Select** • Full-Duplex • Half-Duplex

(continued)

Option	Description	Settings
Media Type	Determines the type of media your network is using. • *Auto Select* allows the NIC to automatically select the Media Type for you. • If you set the NIC *Duplex* setting to *Auto Select*, the *Media Type* is automatically set to *Auto Select*. • If you set the NIC *Duplex* setting manually, you must set the *Media Type* setting manually. **Note**: If you are running Windows 2003, Windows XP, or Windows 2000, changes made to the Media Type setting though the 3Com NIC Diagnostics are not reflected in the registry unless you also change the Media Select property setting in Windows: **1** In the Device Manager window, double-click *Network adapters*. **2** Right-click the 3CR990B NIC and select *Properties*. **3** Select the Advanced tab. **4** Select *Media Select* in the property list, and make the appropriate setting change in the Value list.	• **AUTO SELECT** • 100BASE-TX (100 Mbps) • 10BASE-T (10 Mbps) • 100BASE-FX (100 Mbps)
Self Healing	In BASIC mode, monitors firmware heartbeat and interrupt stalls, and tries to automatically reset the NIC. Also monitors link status and reports changes. In ENHANCED mode, checks for transmit/receive errors and tries to recover.	• **BASIC** • Disabled • Enhanced
Error Tolerance	Specifies threshold levels for transmit/receive errors. An RSL failover or NIC reset occurs when the threshold is exceeded during the sampling period. • High = 100 of each error category (default setting) • Medium = 50 of each error category • Low = 5 of each error category	• **HIGH** • Medium • Low
Alert Type	Enabled alert types are reported to the Windows System Events monitor. The default setting is ALL. Alert types: • Information • Warning • Error	• Off • Information • Warning • Error • **All**
Flow Control	When enabled, the NIC throttles the incoming data packet stream to prevent the input buffers from overflowing and losing packets.	• **Disabled** • Enabled

Configuration Methods

The NIC can be configured using any of the methods listed in the table below.

NOTE: This section describes how to configure the NIC using the 3Com NIC Diagnostics program for Windows. For instructions on using the other two methods, see the file or section mentioned in the table.

Method	Description	Requirement(s)
3Com NIC Diagnostics Program for Windows	Configure the NIC locally using the 3Com NIC Diagnostics program for Windows: **1** Make sure that the 3Com NIC diagnostics program is installed. See "Installing the 3Com NIC Diagnostics Program" on page 46 for installation instructions. See "Using the 3Com NIC Diagnostics Program" on page 47 for usage instructions. **2** Open the Windows *Start* menu. **3** Select *Programs*, and then *3Com NIC Utilities*. **4** Click *3Com NIC Doctor*.	Windows 2003, Windows XP, Windows 2000, Windows NT 4.0, or Windows 98 SE
3Com Configuration and Diagnostics program for DOS	Configure the NIC locally using the 3Com Configuration and Diagnostics program for DOS: **1** Copy 3c99xcfg.exe from the 3Com Installation CD to the root directory of a DOS-bootable diskette. **2** Reboot the computer using the DOS-bootable diskette. **3** Enter at the DOS prompt: `a:\3c99xcfg.exe` See "Using the 3Com DOS Configuration Program" on page 48 for more information. Customers running Japanese DOS must switch to U.S. mode DOS before running this program.	DOS or NetWare
DMI 2.0 or 2.0s	Configure the NIC remotely using the 3Com DMI Agent software. See "Installing the 3Com DMI Agent" on page 72 for more information.	3Com DMI Agent and a DMI-compatible browser or a network management application that supports DMI 2.0 or 2.0s
Windows Property Settings	Configure the NIC locally as described in "Changing Windows 2003, Windows XP, and Windows 2000 Property Settings" on page 40.	Windows 2003, Windows XP, or Windows 2000

Changing General NIC Configuration Settings

This section describes two NIC configuration methods. Depending on your computer operating system, you can use one of the following configuration programs:

- **3Com NIC Diagnostics Program**—for computers running Windows 2003, Windows XP, Windows 2000, Windows NT 4.0, or Windows 98 SE.
- **3Com Configuration and Diagnostics Program for DOS**—for computers running DOS or NetWare.

Installing the 3Com NIC Diagnostics Program

This section describes how to install the 3Com NIC Diagnostics program after you have already installed the network driver. This program is for computers running Windows 2003, Windows XP, Windows 2000, Windows NT 4.0, or Windows 98 SE.

NOTE: If you manually install the network driver by selecting options on the 3Com Installation CD Welcome Screen, you have the option of installing the network driver with or without the 3Com NIC Diagnostics program. If you have already installed the network driver together with the 3Com NIC Diagnostics program for Windows, you can ignore this section.

The 3Com NIC Diagnostics program allows you to run tests that determine the status of your network and the NIC. It also allows you to configure the NIC, view network statistics and LEDs, and access support databases.

NOTE: When you install the 3Com NIC Diagnostics program, the network driver is automatically updated to the latest version on the installation CD.

To install the 3Com NIC Diagnostics program:

1. Turn on the power to the PC and start Windows.
2. Insert the 3Com Installation CD in the CD-ROM drive.

   NOTE: If the Welcome screen does not appear, auto insert is probably not enabled for your CD-ROM drive.

3. Click *NIC Software*.
4. Click *NIC Drivers and Diagnostics*.
5. Click *Update NIC Driver*.
6. Click *Update Drivers and Diagnostic Program.*

   The Update screen appears, displaying a message indicating the 3Com NIC Update Kit has successfully updated the network software, and informing you that you must restart your computer.

   NOTE: If the Update screen does not appear automatically, click the Update button displayed at the bottom of the window.

7. Click *OK* to return to the Update NIC drivers screen.
8. Restart Windows if prompted to do so.

   The installation is complete.

Starting the 3Com NIC Diagnostics Program

To start the 3Com NIC Diagnostics program:

1. Open the Windows *Start* menu.
2. Select *Programs*, and then *3Com NIC Utilities.*
3. Click *3Com NIC Doctor.*

   The 3Com NIC Diagnostic screen appears.

   Alternatively, you can also start the 3Com NIC Diagnostics program using the following procedure if the 3Com NIC Diagnostics icon is displayed on the right side of the Windows task bar:

   - Double-click the 3Com NIC Diagnostics icon.

     The 3Com NIC Diagnostic screen appears.

Using the 3Com NIC Diagnostics Program

This section describes NIC configuration for computers running Windows 2003, Windows XP, Windows 2000, Windows NT 4.0, or Windows 98 SE.

Before you configure the NIC, make sure that:

- The NIC is installed in the computer and is connected to the network.
- The network driver is installed.
- The 3Com NIC Diagnostics program is installed.

To change the NIC general configuration settings, such as network driver optimization, duplex mode, and media type:

1. Open the Windows *Start* menu.
2. Select *Programs*, and then *3Com NIC Utilities.*
3. Click *3Com NIC Doctor.*

   The 3Com NIC Diagnostics General screen appears.

NOTE: Click Help to obtain general information about the function of a screen. To obtain specific information about any topic on a screen, click the question mark (?) in the upper right corner of the screen, move it over a topic, and click once.

4. If your computer has more than one NIC installed, open the Network Interface Card (NIC) list box and select the NIC to be configured.
5. Click the Configuration tab.

   The Configuration screen appears.
6. Under Network Parameter, select the setting to be changed.

   For a description of each setting, click the question mark (?) in the upper right corner of the screen, move it over a setting, and click once.
7. Open the Set Value list box and select a new value from the list of available options.

   Repeat the process to change any other configuration setting.

   To undo changes and return the settings to their previous values, click *Undo Changes*.

   To return the settings to the factory default settings, click *Set Factory Defaults*.
8. Click *OK* to save the changes and exit the program.

Using the 3Com DOS Configuration Program

This section describes NIC configuration for computers running DOS or NetWare.

To run the DOS diagnostic program:

1. Copy 3c99xcfg.exe from the 3Com Installation CD to the root directory of a DOS-bootable diskette.
2. Boot to DOS using the DOS-bootable diskette.
3. Enter the following at the DOS prompt:

   `a:\3c99xcfg.exe`

   where a:\ is the drive containing the DOS-bootable diskette.

   If multiple NICs are installed in the computer, select Select NIC on the first screen to display a list of installed NICs. Use the arrow keys to select the NIC that you want to configure and press Enter.
4. Use the arrow keys to scroll the list and make a selection. Press Enter.

NOTE: On the Configuration screen, when you choose the Auto Select setting for Media Type, the setting for Duplex is automatically changed to Auto Select. Selecting Auto Select for Duplex automatically changes the Media Type setting to Auto Select.

NOTE: Note that any configuration change you make through the Windows 2003 or Windows 2000 Advanced tab overrides the same configuration setting made through the 3Com NIC (Windows) Diagnostics program or the 3Com DOS Diagnostic program**.**

5. Continue this procedure for other options. For more information on a specific option, select the option and press F1.

NOTE: Press Esc to return to a previous screen. If a secondary window is open, press Esc to close the window.

Configuring the Managed PC Boot Agent (MBA)

This section explains how to configure the Managed PC Boot Agent (MBA) boot ROM to boot from the network.

NOTE: For detailed information on using, configuring, and troubleshooting the MBA boot ROM, refer to the *Managed PC Boot Agent User Guide*, located with the MBA software on the 3Com Installation CD.

Enabling or Disabling the Boot ROM Setting

The default NIC boot ROM setting is *Disabled*. This setting must be enabled to boot from the network.

To enable or disable the NIC boot ROM setting:

1. Make sure that the NIC is installed and is connected to the network and that the NIC driver is installed.
2. Open the Windows *Start* menu.
3. Select *Programs*, and then *3Com NIC Utilities*.
4. Click *3Com NIC Doctor.*
   The 3Com NIC Diagnostics General screen appears.
5. Select the Configuration tab.
   The Configuration screen appears.
6. Under Network Parameter, select *NetBoot ROM*.
7. Open the Set Value list box and select *Enabled* to enable the boot ROM or *Disabled* to disable the boot ROM.
8. Click *OK* to save the setting and exit the program.

Booting From the Network

The boot process for the MBA boot ROM varies depending on the type of computer you have (BBS BIOS-compatible or non-BBS BIOS-compatible).

If your computer was purchased recently, it may be BBS (BIOS Boot Specification) BIOS-compatible. The BBS determines how the system BIOS identifies boot devices in a computer (such as a CD-ROM drive, a hard drive, or a floppy drive), allows the user to select the boot order of these devices, and then attempts to boot from each device in the specified order.

Refer to your computer documentation if you do not know which type of computer you have.

BBS BIOS-Compatible PCs

To enable a BBS BIOS-compatible computer to boot from the network using the MBA boot ROM:

1. Make sure that the NIC boot ROM setting is *Enabled*.
   See the previous section, "Enabling or Disabling the Boot ROM Setting," for instructions.
2. Set the MBA manually as the first boot device in the computer BIOS.
   Refer to your computer documentation for instructions on accessing and configuring the computer BIOS.

3 Reboot the computer.

The MBA attempts to boot from the network using the default boot method PXE. To change the default boot method or any other MBA configurations, press Ctrl+Alt+B when the following message appears:

```
Initializing MBA. Press Ctrl+Alt+B to configure...
```

If the network boot fails, the following message appears:

```
Network boot aborted, press any key to continue
```

The BIOS continues to the next device in the boot order (for example, the local hard drive).

NOTE: To cancel the network boot, press Esc anytime during the network boot process.

Non-BBS BIOS-Compatible PCs

To enable a non-BBS BIOS-compatible computer to boot from the network using the MBA boot ROM:

1 Make sure that the NIC boot ROM setting is *Enabled*.

See "Enabling or Disabling the Boot ROM Setting" on page 49 for instructions.

2 Change the MBA default boot setting from *Local* to *Network*.

To change the default boot setting or any other MBA configurations, use the MBACFG utility or press Ctrl+Alt+B when the following message appears:

```
Initializing MBA. Press Ctrl+Alt+B to configure...
```

NOTE: For more information on using, configuring, and troubleshooting the MBA boot ROM, refer to the *Managed PC Boot Agent User Guide,* located with the MBA software on the 3Com Installation CD.

Disabling the 3Com Logo

To disable the 3Com logo that appears during startup:

1 Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.

2 Open the Windows *Start* menu.

3 Select *Programs*, and then *3Com NIC Utilities.*

4 Click *3Com NIC Doctor.*

The 3Com NIC Diagnostics General screen appears.

5 On the General screen, make sure that the check box next to *Show 3Com Logo on Startup* is not selected.

6 Exit the 3Com NIC Diagnostics program.

12 Troubleshooting the NIC

This chapter describes procedures for locating problems you might have with the 3Com 10/100 Secure (3CR990B) NIC. It explains how to:

- Interpret the NIC LEDs.
- Access 3Com support databases.
- Troubleshoot NIC installation problems.
- Troubleshoot NIC and network connection problems.
- Troubleshoot Remote Wake-Up.
- Remove the network driver.

NOTE: To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:

http://knowledgebase.3com.com

Interpreting the NIC LEDs

The 3CR990B NICs have light-emitting diodes (LEDs), as described in the following tables, that can assist with network troubleshooting.

3CR990B-97 NIC

LED	State	Meaning
YEL/100 GRN/10	Yellow	If drivers are installed, the 100BASE-TX connection is active. If drivers are not installed, the NIC is receiving power.
	Green	If drivers are installed, the 10BASE-T connection is active. If drivers are not installed, the NIC is receiving power.
	Off	Something is preventing the connection between the NIC and the hub or switch.
	Blinking	The cable polarity is reversed. Try a different network cable or contact your system administrator.
ACT (activity)	Blinking	Network traffic is present.
	Steady	Heavy network traffic is present.
	Off	No network traffic is present.

3CR990B-FX-97 NIC

LED	State	Meaning
100 LNK	Green	If drivers are installed, the 100BASE-FX connection is active; there is a good connection between the NIC and the hub or switch.
	Blinking	N/A
	Off	Something is preventing the connection between the NIC and the hub or switch.
ACT LNK	Yellow	Heavy network traffic is present.
	Blinking	Network traffic is present.
	Off	No network traffic is present.

Viewing the NIC LEDs in the Diagnostics Program

To view the LEDs in the 3Com NIC Diagnostics program:

1. Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.

NOTE: For instructions on using the 3Com NIC Diagnostics program, see "Using the 3Com NIC Diagnostics Program" on page 47.

2. Open the Windows *Start* menu.
3. Select *Programs*, and then *3Com NIC Utilities.*
4. Click *3Com NIC Doctor.*

   The 3Com NIC Diagnostics General screen appears and displays following LEDs:
   - **Link** — lights if there is a valid connection between the NIC and the network.
   - **Transmit** — lights if the NIC is transmitting information.
   - **Receive —** lights if the NIC is receiving information.

Troubleshooting Problems with the LEDs

If a Link LED indicates a problem, check the following to ensure that:

1. Your network hub or switch and the cable connecting to your NIC comply with the specifications appropriate for your network connection.
2. The hub or switch is powered on.

Accessing 3Com Support Databases

In addition to the 3Com support databases listed in this section, check the README.TXT files in the ENGLISH, INSTALLS, and NWSERVER subdirectories and check the Help text files located in the HELP directory on the 3Com Installation CD.

Accessing the 3Com Knowledgebase

To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:

`http://knowledgebase.3com.com`

Accessing the 3Com NIC Help System

To access the 3Com NIC Help system:

1. Make sure that the NIC, its driver, and the 3Com NIC Diagnostics program are installed.

   See "Installing the 3Com NIC Diagnostics Program" on page 46 for instructions.
2. Open the Windows *Start* menu.
3. Select *Programs*, and then *3Com NIC Utilities*.
4. Select *3Com NIC Doctor Help*.

   The main Help screen appears.
5. Click *Help Topics* to display a list of Help topics or click *Find* to search for a Help topic.

Accessing Release Notes and Frequently Asked Questions

To access release notes and frequently asked questions about the NIC:

1. Make sure that the NIC, its driver, and the 3Com NIC Diagnostics program are installed.

   See "Installing the 3Com NIC Diagnostics Program" on page 46 for instructions.
2. Open the Windows *Start* menu.
3. Select *Programs*, and then *3Com NIC Utilities.*
4. Click *3Com NIC Doctor.*

   The 3Com NIC Diagnostics General screen appears.
5. Click the Support tab.

   The Support screen appears.
6. *Click Support Databases* to display customer support databases about the NIC in three categories:
   - **Release notes —** Display tips about installing and using the NIC.
   - **Frequently asked questions —** Display common questions asked by customers and answered by 3Com support experts.
   - **Knowledgebase topics** — Display NIC compatibility topics.

Troubleshooting the NIC Installation

If you encounter any of the following problems or error messages, follow the steps in "Cleaning Up A Failed Installation" later in this chapter to resolve the problem.

Problems or Error Messages

- A red X or a A yellow exclamation point (!) appears by the name of the NIC in the Windows Device Manager.
- The Network Neighborhood icon does not appear on the Windows desktop.
- The NIC does not appear in the Network Configuration or Properties window.
- The NIC fails to authenticate the firmware image that the driver downloads, and then the following error message appears in the Microsoft Event Viewer: "DownloadRunTimeImage: Download Firmware Failed Image Authentication."
- Error: "This device is not present, not working properly, or does not have all of the driver installed. Code 22."
- Error: "Windows was unable to locate a driver for this device."
- Error: "You have selected a plug and play adapter. Please turn off your machine and install the adapter. Then turn on your machine and reinstall."

Cleaning Up A Failed Installation

If you encounter any of the problems or error messages listed above, or if the network driver installation failed or was not completed properly, follow the steps below to clean up your system and install the NIC correctly. This procedure:

- Removes all 3CR990B NIC drivers from your system.
- Removes the 3Com NIC Diagnostics program.
- Installs the latest network driver.

You can reinstall the 3Com NIC Diagnostics program after completing this procedure. See "Installing the 3Com NIC Diagnostics Program" on page 46 for instructions.

1. Insert the installation CD in the CD-ROM drive.

   The Welcome screen appears.
2. Click *NIC Software*.
3. Click *Installation Utilities*.
4. Click *Undo Broken Installation and Uninstall*.

   You are given the option to *Proceed* or go *Back*. Before proceeding, write down your network settings so that you can refer to your notes when you reinstall the NIC.
5. Click *Proceed*.

   The uninstall process begins. A warning message appears.
6. Click *OK*.

   A message appears stating that all of the 3CR990B NICs have been removed from your system.
7. Click *OK*.
8. Exit the installation CD, and then exit Windows.
9. Restart the computer.

10 Install the network driver.

If you are prompted for 3Com files when Windows restarts, open the drop-down box and select the following path:

\options\cabs

See the appropriate chapter for your operating system for information about confirming that the NIC and driver are properly installed.

After the driver has been reinstalled, reinstall the 3Com NIC Diagnostics program. See "Installing the 3Com NIC Diagnostics Program" on page 46 for instructions.

Troubleshooting the Network Connection

If you encounter problems with using the NIC or connecting to the network, check the table below for troubleshooting tips.

NOTE: Before inserting or removing the NIC from the computer, turn the computer power off and unplug the power cord.

Tip	Description
Check the NIC hardware installation	Make sure that the NIC is installed correctly in a PCI slot. Check for specific hardware problems, such as broken traces or loose or broken solder connections. See "Installing and Connecting the NIC" on page 3.
Check the NIC software installation	Make sure that the NIC software is installed correctly in the computer. See the appropriate chapter for your operating system for information about confirming that the NIC and driver are properly installed.
Check the network connection	• Inspect all cables and connections. Make sure that the cable complies with length and rating specifications described in "Preparing the NIC and the Computer" on page 2. • Examine the cable for obvious signs of damage, wear, or crimping. Substitute a known working cable. Check the length and rating of the cable. Make sure that the cable complies with 10BASE-T, 100BASE-TX, or 100BASE-FX recommendations.
Check the computer BIOS	Make sure that you are running the latest BIOS for your computer. If the BIOS has not been upgraded in the previous 12 months, contact the computer manufacturer to obtain the current version of the BIOS software.
Run the NIC diagnostic tests	Run the NIC and Network Tests, as described in "Running the NIC Diagnostics Tests" on page 62. If the tests fail, replace the NIC with a known working NIC and run the tests again, using the same configuration settings as those used on the failed NIC. If the working NIC passes all tests, the original NIC is probably defective. For information on product repair, see "Obtaining Support for your Product" on page 75.
Check the 3Com support databases	Review the known problems and solutions found in the following areas: • 3Com Knowledgebase • 3Com NIC Help system • Release Notes and Frequently Asked Questions See "Accessing 3Com Support Databases" on page 53 for instructions on using these databases.
Download the latest NIC driver	The 3Com Software Library is your World Wide Web connection to software, drivers, and .INF files for all 3Com products. Point your browser to the 3Com Web page (http://www.3com.com/). Under Service and Support, click *Software, Drivers & INFs*.
Run the *Clean Up Failed Installation* program	The *Clean Up Failed Installation* program is located on the installation CD. See "Cleaning Up A Failed Installation" on page 54 for instructions.

Troubleshooting Remote Wake-Up

If your computer does not boot in response to a Remote Wake-Up event, perform these troubleshooting steps:

NOTE: Wake-On-Error is enabled by default.

1. Make sure that you are using the latest driver for the NIC.

   This driver is shipped with the NIC on the 3Com Installation CD. It can also be downloaded from the 3Com Software Library. Point your Web browser to the 3Com home page:

   http://www.3com.com/

   Under Service and Support, click *Software, Drivers, and INFs*.

2. Check the computer BIOS.
   - Boot the computer and enter the BIOS.

     For instructions on entering the BIOS, refer to the computer documentation or consult the computer vendor.
   - Locate the Wake-Up on LAN event setting.
   - Verify that the setting is enabled.
3. If the previous steps have failed, install a known functioning Remote Wake-Up NIC in the computer.
   - If Remote Wake-Up works with the new NIC installed, consult your computer vendor for a replacement NIC.
   - If Remote Wake-Up does not work with the new NIC installed, there may be a problem with the computer motherboard. Consult your computer manufacturer.

Troubleshooting a Network Connection

When working with 10BASE-T or 100BASE-TX cabling, concentrators, and NICs from different vendors, it is possible to connect everything but still have no network communication.

NOTE: For additional network troubleshooting information, see "Running the NIC Diagnostics Tests" on page 62.

To narrow the range of possible causes of common network connection problems:

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1. Determine whether your equipment complies with the 10BASE-T or 100BASE-TX standard.

   This is particularly important for data concentrators (hubs or repeaters).

2. Connect a straight-through cable from the computer to the hub.

   The hub performs an internal crossover so that the signal can go from TD+ to RD+ and TD– to RD–. When you look at an RJ-45 connector from the front (that is, the opposite side from where the wires enter the connector), pin 1 is identified on the right side when the metal contacts are facing up.

3. Make sure that the TD+ and TD– wires are twisted together, and that the RD+ and RD– are twisted together.

   Using wires from opposing pairs can cause signals to be lost.

Troubleshooting Hubs

A crossover cable can be used to identify the type of failure when hub performance or connectivity is in question.

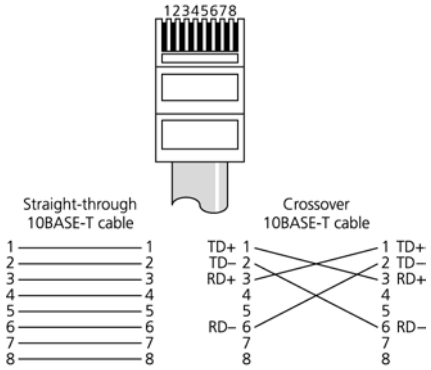
To use a crossover cable:

1. Connect a file server and a client PC back-to-back with a crossover cable to verify that the NIC and network operating system are properly configured.
2. To make a crossover cable, connect TD+ to RD+ and TD– to RD–.

   The cable performs the crossover that is usually performed by the hub.

RJ-45 Cabling Pinouts (Copper NIC Only)

The following illustration compares the cabling pinouts for straight-through and crossover cables on the 3CR990B-97 NIC.



If the file server and client PC function together as a small network, then either the existing cabling or the hub is failing.

When a crossover cable is used, the LED on the NIC functions differently than it would under normal operating conditions. For example, with a correct crossover connection, the LED lights, whereas with a straight-through connection, the LED does not light. If you make a crossover cable and the polarity is mismatched (that is, TD+ to RD– instead of TD+ to RD+), the LED blinks.

Removing the Network Driver

To remove the network driver from your computer, follow the steps for your operating system.

NOTE: Removing the network driver does not result in the removal of the diagnostics software. See "Removing the 3Com NIC Diagnostics Program" on page 65.

Windows 2003, Windows XP, and Windows 2000

The Windows 2003, Windows XP, and Windows 2000 systems do not allow you to uninstall the network driver from the Network and Dial-up Connections window. To remove the network driver:

1. Right-click the My Computer icon.
2. Select *Properties* on the pop-up menu.
   The System Properties screen appears.
3. Select the Hardware tab.
4. Click *Device Manager* in the middle panel.
   The Device Manager screen appears.
5. Double-click *Network Adapters*.
6. Right-click the name of the NIC.
7. Select *Uninstall* on the pop-up menu.
   A warning message appears.
8. Click *OK* to confirm the driver removal.
   The network driver is removed. The Device Manager screen appears.

NOTE: The Windows 2003, Windows XP, and Windows 2000 systems do not allow you to uninstall the 3Com Advanced Server technology miniport using the Device Manager. To remove Advanced Server technology features, see "Removing 3Com DynamicAccess Advanced Server Features" on page 60.

9. Exit the Device Manager and shut down Windows.
   To reinstall the NIC driver and software, restart the computer.
   To physically remove the NIC from the computer, shut down the system, turn the power off, and remove the NIC from the computer.

Windows NT 4.0

To remove the network driver:

1. Double-click the My Computer icon, then the Control Panel icon, and then the Network icon.
   The Network screen appears.
2. Click the Adapters tab.
3. Select the name of the NIC in the Network Adapters box, and then click *Remove*.
4. Click *Yes* to confirm the removal.
5. Click *Close* to close the Network screen.
   You are prompted to restart the computer.

6 Depending on whether you are removing the NIC or reinstalling NIC software, do the following:
   - If you are physically removing the NIC from the computer, click *No*. Do not restart the computer until you shut down the system, turn the power off, and remove the NIC from the computer.
   - If you are reinstalling the NIC software, click *Yes* to restart the computer.

Windows 98 SE

To remove the network driver:

1 Double-click the My Computer icon, then the Control Panel icon, and then the System icon.

2 Click the Device Manager tab.

3 Double-click *Network adapters*.

4 Select the name of the NIC.

5 Click *Remove*.

6 Click *OK* to confirm the device removal.

   You are prompted to restart the computer.

   If you are physically removing the NIC from the computer, click *No*. Do not restart the computer until you shut down the system, turn the power off, and remove the NIC from the computer.

   If you are reinstalling the NIC software, click *Yes* to restart the computer.

Removing 3Com Dynamic*Access* Advanced Server Features

Follow the steps in this section to remove 3Com Dynamic*Access* Advanced Server features from your operating system.

Windows 2003, Windows XP, and Windows 2000

The Windows 2003, Windows XP, and Windows 2000 systems do not allow you to uninstall the 3Com Advanced Server technology miniport using the Device Manager. To remove 3Com Dynamic*Access* Advanced Server features:

1. Launch the Network and Dial-up Connections window.
2. Select a Local Area Connection icon.
3. Click the right mouse button and select *Properties* from the menu.
   The Local Area Connections Properties window appears.
4. Click the General tab.
5. In the General window, select Dynamic*Access* Protocol and click *Uninstall*.

Windows NT 4.0

To remove 3Com Dynamic*Access* Advanced Server features:

1. From the *Start* menu, select *Settings/Control Panel*.
2. Double-click the Network icon.
3. In the Network window, click the *Protocols* tab.
4. In the Protocols tab, select *DA Pass Thru Driver Transport*.
5. Click *Remove*.
6. Follow the prompts to remove the software and reboot the server.

NetWare

To remove 3Com Dynamic*Access* Advanced Server features:

1. Enter this command at the prompt:
   `load nwconfig`
2. In the Installation Options screen, select *Product options*.
3. In the Other Installation Actions screen, select *View/Configure/Remove installed products*.
   The Currently Installed Products screen appears, listing software products that are installed in the system.
4. From the list of products, select *3Com DynamicAccess Server Features* and press Del.
5. Select *Yes* to remove the software.

13 Running NIC Diagnostics

The 3Com 10/100 Secure (3CR990B) NIC uses two types of NIC diagnostics programs: a Windows-based diagnostics program and a DOS-based diagnostics program.

NOTE: Before starting any diagnostics program, close all running applications.

Use the Windows-based 3Com NIC Diagnostics program if your computer is running any of the following operating systems:

- Windows 2003
- Windows XP
- Windows 2000
- Windows NT 4.0
- Windows 98 SE

Use the 3Com DOS Diagnostics program if your computer is running any of the following operating systems:

- DOS
- NetWare

NOTE: The following sections explain how to start both NIC diagnostics programs. However, specific instructions are provided only for using the Windows-based 3Com NIC Diagnostics program.

This chapter explains how to:

- Run the NIC diagnostic tests.
- View the NIC LEDs in the NIC Diagnostics program.
- View network statistics.
- Use the 3Com icon in the Windows system tray.
- Remove the 3Com NIC Diagnostics program.

Running the 3Com DOS Diagnostics Program

To start the 3Com DOS diagnostics program for DOS and NetWare installations:

1. Copy 3c99xcfg.exe from the installation CD to the root directory of a DOS-bootable diskette.

CAUTION: If you are running Japanese DOS, you must switch to U.S. mode DOS before running the 3Com DOS diagnostics program.

2. Boot to DOS using the DOS-bootable diskette.

3 Enter the following at the DOS prompt:

a:\3c99xcfg.exe

where a:\ is the drive containing the DOS-bootable diskette.

For more information about the 3Com DOS Diagnostics program to configure the NIC, see "Using the 3Com DOS Configuration Program" on page 48.

Running the NIC Diagnostics Tests

The 3Com NIC Diagnostics program for Windows contains tests that can check the status of the following items:

- Network
- NIC

To run the NIC Test or Network Test:

1 Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.

2 Open the Windows *Start* menu.

3 Select *Programs*, and then *3Com NIC Utilities*.

4 Click *3Com NIC Doctor.*

The 3Com NIC Diagnostics screen appears.

NOTE: Click Help to obtain general information about the function of a screen. To obtain specific information about any topic on a screen, click the question mark (?) in the upper right corner of the screen, move it over a topic, and click once.

The following tabs are available for viewing NIC data:

Tab	Description
General	Select the General tab to display the node address, I/O address, and device ID for the installed NIC.
Configuration	Select the Configuration tab to view and modify configuration settings for the installed NIC.
Statistics	Select the Statistics tab to view network traffic statistics about the installed NIC.
Diagnostics	Select the Diagnostics tab to access diagnostics tests that you can run on the installed NIC.
Support	Select the Support tab to access various 3Com customer support resources.
Utilities	Select the Utilities tab to: • Update firmware for the installed NIC. • Perform an encryption loopback test (to test the encryption chip). • Test the SMBus on the system.

5 Select the Diagnostics tab.

The Diagnostics screen appears.

Running the Network Test

Run the Network Test to check the NIC connectivity to the network. To successfully pass the Network Connectivity test, at least one of the following conditions must be met:

- A Windows client running on the same network. This client must have a successfully installed Windows diagnostics program that is currently not running.
- A NetWare server running on the same network.
- A DHCP server running on the same network.
- A DNS server running on the same network with TCP/IP properties configured for the DNS server.

To run the Network test:

1. On the Diagnostics screen, click *Run Network Test*.
   The Network Connectivity Test screen appears.
2. Click *Start*.
   If the test passes, the NIC connection to the network is functioning correctly.
3. Click *Close*.
   If the test fails, make sure that the:
   - NIC is properly connected to the network cable.
   - Hub or switch to which the NIC is connected is powered on.
   - Cable complies with the proper length and specifications for your network.

Running the NIC Test

Run the NIC Test to check the physical components, connectors, and circuitry on the NIC.

1. On the Diagnostics screen, click *Run NIC Test*.
   The NIC Test screen appears.
2. Click *Perform NIC Test*.
   While the test is running, a progress bar indicates test progress.
   - If the test passes, the NIC is functioning correctly.
   - If the test fails, a message indicates the error type. Click *Help* in the error message screen to obtain more information.
3. Click *Close*.

Viewing the NIC LEDs in the 3Com Diagnostics Program

To view the LEDs in the 3Com NIC Diagnostics program:

1. Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.
2. Open the Windows *Start* menu.
3. Select *Programs*, and then *3Com NIC Utilities.*
4. Click *3Com NIC Doctor.*

   The 3Com NIC Diagnostics General screen appears and displays the following LEDs:
   - **Link**—lights if there is a valid connection between the NIC and the network.
   - **Transmit**—lights if the NIC is transmitting information.
   - **Receive**—lights if the NIC is receiving information.

NOTE: For instructions on interpreting the NIC LEDs, see "Interpreting the NIC LEDs" on page 51.

Viewing Network Statistics

To view statistical information about the network:

1. Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.
2. Open the Windows *Start* menu.
3. Select *Programs*, and then *3Com NIC Utilities.*
4. Click *3Com NIC Doctor.*

   The 3Com NIC Diagnostics General screen appears.
5. Click the Statistics tab.

   The Statistics screen appears, providing numerical data for a variety of network events, such as: packets transmitted, bytes transmitted, late collisions, and so forth. The information is updated by the NIC driver every five seconds.

   For a description of each statistic, click the question mark (?) in the upper right corner of the screen, drag it over a statistic and click once. A pop-up box appears, displaying information about the statistic.
6. Click *OK* to exit the diagnostics program. To go to another diagnostics screen, click the appropriate tab.

Using the 3Com Icon in the Windows System Tray

The 3Com icon, which can be enabled to appear in the Windows system tray, allows you to start the 3Com NIC Diagnostics program. It also allows you to view the NIC's link speed and number of frames sent and received.

Enabling the Icon

To display the 3Com icon in the Windows system tray:

1. Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.
2. Open the Windows *Start* menu.
3. Select *Programs*, and then *3Com NIC Utilities.*
4. Click *3Com NIC Doctor.*
   The 3Com NIC Diagnostics General screen appears.
5. On the General screen, select the check box next to *Show Icon in System Tray.*
6. Close the 3Com NIC Diagnostic program.
   The NIC icon appears in the Windows system tray. When you double-click the icon, the 3Com NIC Diagnostics program starts.

Displaying Network Statistics

When you drag the mouse pointer over the icon (but do not double-click the icon) a network statistics box appears, displaying the following information:

- **Frames Sent and Received**—A count of the number of frames (packets) sent and received through the NIC since the last time statistics were reset.
- **Link Speed**—The speed (10 Mbps or 100 Mbps) at which the NIC is connected to the network.

The information is updated each time you move your mouse pointer over the 3Com icon.

Removing the 3Com NIC Diagnostics Program

The 3Com NIC Diagnostics Program can be removed using the Add/Remove Programs Wizard in Windows, or by using the 3Com Installation CD.

For instructions on using the Add/Remove Programs Wizard in Windows, refer to your Windows documentation.

To remove the 3Com NIC Diagnostics program using the 3Com Installation CD*:*

1. Start Windows.
2. Insert the 3Com Installation CD in the CD-ROM drive.
   The Welcome screen appears.
3. Click *NIC Software*.
4. Click *NIC Drivers and Diagnostics.*
5. Click *Installation Utilities*.
6. Click *Remove Diagnostics*.
7. Click *Proceed*, and then follow the prompts on the screen.

A Specifications and Cabling Requirements

This appendix lists the specifications, standards conformance, cable requirements, and connector pin assignments for the 3Com 10/100 Secure (3CR990B) NIC.

3CR990B-97 NIC Specifications

The following table provides environmental, interface, and standards information for the 3CR990B-97 NIC.

Hardware	
Memory	128 KB external RAM
Bus interface	*PCI Local Bus Specification, Revision 2.2*
PCI master	Supports bus master scatter-gather DMAs.
Dimensions	Length: 13.31 cm (5.24 in) Height: 8.51 cm (3.35 in)
Power requirement	+5 V ±5% operating 1.26A maximum for normal operation (375 mA for low power mode)
Network Interface	
10 Mbps Ethernet 10BASE-T	Ethernet IEEE 802.3 industry standard for a 10 Mbps baseband CSMA/CD local area network
100 Mbps Ethernet 100BASE-TX	Ethernet IEEE 802.3u industry standard for a 100 Mbps baseband CSMA/CD local area network
Environment	
Operating temperature	32° to 158° F (0° to 70° C)
Storage temperature	–22° to 194° F (–30° to 90° C)
Operating humidity	10 to 90% noncondensing
Storage humidity	10 to 90% noncondensing
Altitude	–300 to 3,000 m (–984 ft to 9,840 ft)
Standards Conformance	
• IEEE 802.3 10BASE-T • IEEE 802.3u 100BASE-TX • IEEE 802.3x full-duplex, auto negotiation, and flow control • IEEE 802.1p (General Attribute Registration protocol) for multicast addresses • IEEE 802.1Q VLAN Tagging	• Microsoft PC97 • Microsoft PC98 • Microsoft PC99 • PCI 2.1 and 2.2 • DMI 1.0 and 2.0 • ACPI 1.0 • SMBus 2.2 • WBEM, CIM, WMI

3CR990B-FX-97 NIC Specifications

The following table provides environmental, interface, and standards information for the 3CR990B-FX-97 NIC.

Hardware	
Memory	128 KB external RAM
Bus interface	*PCI Local Bus Specification, Revision 2.2*
PCI master	Supports bus master scatter-gather DMAs.
Dimensions	Length: 13.65 cm (5.375 in) Height: 8.41 cm (3.31 in)
Power requirement	+5 V ±5% operating 1.26A maximum for normal operation (375 mA for low power mode)
Network Interface	
100 Mbps Ethernet 100BASE-FX	Ethernet IEEE 802.3u industry standard for a 100 Mbps fiber local area network
Environment	
Operating temperature	32° to 158° F (0° to 70° C)
Storage temperature	–22° to 194° F (–30° to 90° C)
Operating humidity	10 to 90% noncondensing
Storage humidity	10 to 90% noncondensing
Altitude	–300 to 3,000 m (–984 ft to 9,840 ft)
Standards Conformance	
• IEEE 802.3 100BASE-FX • IEEE 802.3x full-duplex, auto negotiation, and flow control • IEEE 802.1p (General Attribute Registration protocol) for multicast addresses • IEEE 802.1Q VLAN Tagging • PCI 2.1 and 2.2	• Microsoft PC97 • Microsoft PC98 • Microsoft PC99 • DMI 1.0 and 2.0 • ACPI 1.0 • SMBus 2.2 • WBEM

Cabling Requirements

The cable, quality, distance, and connectors must comply with the Electronic Industries Association/Telecommunications Industries Association (EIA/TIA) 568 *Commercial Building Wiring Standard* and the Technical Services Bulletin TSB38 standards.

Network connection criteria are shown below:

3CR990B-97 NIC

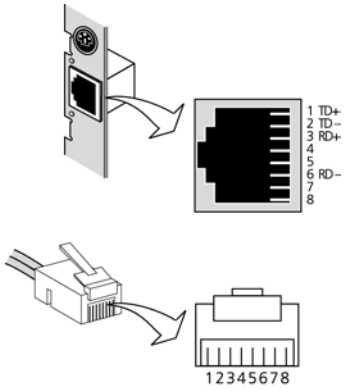
NIC:	3CR990B-97
Cable:	Category 3, 4, or 5 unshielded twisted pair
Network cable connector:	RJ-45
Transceiver:	On-board
Maximum Network Segment:	100 m (328 ft)
Speed:	10/100 Mbps
Media Type:	10BASE-T 100BASE-TX

3CR990B-FX-97 NIC

NIC:	3CR990B-FX-97
Cable:	Long-wavelength fiber-optic (1300nm): 50 µ/125 µ multimode fiber 62.5 µ/125 µ multimode fiber
Network cable connector:	SC
Transceiver:	On-board
Maximum Network Segment:	
50 µ/125 µ multimode fiber	Full-duplex: 2,000 m (6,560 ft) Half-duplex: 412 m (1,351 ft)
62.5 µ/125 µ multimode fiber	Full-duplex: 2,000 m (6,560 ft) Half-duplex: 412 m (1,351 ft)
Speed:	100 Mbps
Media Type:	100BASE-FX

RJ-45 Connector Pin Assignments

The following illustration shows the RJ-45 connector pin assignments for the 3CR990B-97 NIC.



B Installing the 3Com DMI Agent

This appendix explains how to install the 3Com Desktop Management Interface (DMI) Agent on your PC.

The 3Com DMI Agent allows any DMI-compatible browser or network management application that supports DMI 2.0 to remotely manage and configure advanced features of a 3CR990B NIC.

NOTE: For detailed information about the 3Com DMI Agent, refer to the *3Com DMI Agent User Guide* included with the 3Com DMI Agent software on the 3Com Installation CD.

About the 3Com DMI Agent

The 3Com DMI Agent allows you to obtain basic NIC information, including:

- Node address
- MAC address
- Driver version

Additionally, depending on the features of your NIC, the 3Com DMI Agent allows you to view and configure advanced NIC features, including:

- Managed PC Boot Agent (MBA) software
- Remote Wake-Up events
- Workgroup keep-alive packet
- Remote system alerts (including heartbeat)

Each PC that contains a 3CR990B NIC and the 3Com DMI Agent generates a Management Information Format (MIF) file that contains information about the PC and the NIC. DMI applications use the information from the MIF to manage the PC and the NIC.

The content of the MIF is based on the capabilities of the NIC driver found in the PC. For example, if a NIC with an MBA boot ROM is found, all groups related to the boot ROM are included in the MIF for that particular NIC. This ensures that the network management application does not receive irrelevant information for the NIC.

For a description of each MIF supported by the 3Com DMI Agent, refer to the *3Com DMI Agent User Guide* included with the 3Com DMI Agent software on the 3Com Installation CD.

System Requirements

This section lists the client PC and network management requirements for installing and using the 3Com DMI Agent.

Client PC Requirements

Your PC requires the following items to use the 3Com DMI Agent:

- DMI Service Provider 2.0 or greater (such as Smart Technologies Service Provider 2.0)
- NDIS 3, 4, or 5 driver
- Windows 2003, Windows XP, Windows 2000, Windows NT 4.0, or Windows 98 SE using the latest Service Pack.

Network Management Requirements

The 3Com DMI Agent InstallShield Wizard checks for the presence of a DMI service provider on the computer you are configuring as a network management station. The network management station requires a DMI-compatible browser or a network management application that supports DMI 2.0, such as:

- Hewlett Packard TopTools
- Tivoli Management Suite
- Dell OpenManage
- Compaq Insight Manager Management Station
- Intel LANDesk Client Manager

Installing the 3Com DMI Agent

This section describes how to install the 3Com DMI Agent on a PC running Windows 2003, Windows XP, Windows 2000, Windows NT 4.0, or Windows 98 SE.

NOTE: Before installing the DMI Agent, logon to the PC with an account that has system administration privileges.

To install the 3Com DMI Agent:

1. Make sure that the PC meets the requirements listed in "Minimum Installation Requirements" on page 1.
2. Make sure that the 3CR990B NIC is installed in the PC and is connected to the network.
3. Insert the 3Com Installation CD in the CD-ROM drive.

   The Welcome screen appears.
4. Click *NIC Software*.
5. Click *Install 3Com DMI Agent Now*.

   The 3Com DMI Agent setup program prepares the InstallShield Wizard, which allows you to:
   - View the latest README.TXT file
   - Copy the *3Com DMI Agent User Guide* to your computer hard drive.

NOTE: The *3Com DMI Agent User Guide* is in Microsoft Word format. If you do not currently have access to Microsoft Word, you can download a free version of the Microsoft Word reader from the Microsoft Web site.

- Install the 3Com DMI Agent software

6 Follow the prompts on the screen.

To verify successful installation, use a DMI-compatible browser or a network management application that supports DMI 2.0 or 2.0s to verify that the 3Com NIC is present.

NOTE: If you have 3Com Dynamic*Access* Advanced Server features and a foreign (non-3Com) NIC installed, the foreign NIC is displayed as a 3Com NIC in the DMI browser.

Refer to the *3Com DMI Agent User Guide* or contact your system administrator for instructions.

C Obtaining Support for your Product

Register Your Product to Gain Service Benefits

To take advantage of warranty and other service benefits, you must first register your product at **http://eSupport.3com.com/**. 3Com eSupport services are based on accounts that you create or have authorization to access. First time users must apply for a user name and password that provides access to a number of eSupport features including Product Registration, Repair Services, and Service Request.

Purchase Value-Added Services

To enhance response times or extend warranty benefits, contact 3Com or your authorized 3Com reseller. Value-added services can include 24x7 telephone technical support, software upgrades, onsite assistance or advance hardware replacement. Experienced engineers are available to manage your installation with minimal disruption to your network. Expert assessment and implementation services are offered to fill resource gaps and ensure the success of your networking projects. More information on 3Com Extended Warranty and Professional Services is available at **http://www.3com.com/**.

Where To Go For Help

Contact your authorized 3Com reseller or 3Com for additional product and support information. You will find support tools posted on the 3Com web site at **http://www.3com.com/**

Troubleshoot Online

3Com Knowledgebase helps you troubleshoot 3Com products. This query-based interactive tool is located at **http://knowledgebase.3com.com/** and contains thousands of technical solutions written by 3Com support engineers.

Connection Assistant helps you install, configure and troubleshoot 3Com desktop and server NICs, wireless cards and Bluetooth devices. This diagnostic software is located at **http://www.3com.com/prodforms/software/connection_assistant/ca_thankyou.html**

Access Software Downloads

Software Updates are the bug fix/maintenance releases for the version of software initially purchased with the product. In order to access these Software Updates, you must first register your product on the 3Com web site at **http://eSupport.3com.com**/. First time users will need to apply for a user name and password. A link to software downloads can be found from the **http://eSupport.3com.com/** page or from the **http://www.3com.com/** home page.

Software Upgrades are the software releases that follow the software version included with your original product. In order to access upgrades and related documentation you must first purchase a service contract from 3Com or your reseller.

Contact Us

3Com offers telephone, e-mail and internet access to technical support and repair services. To access these services for your region, use the appropriate telephone number, URL or e-mail address from the list below. You will find a current directory of support telephone numbers posted on the 3Com web site at:

http://csoweb4.3com.com/contactus/

Telephone Technical Support and Repair

To obtain telephone support as part of your warranty and other service benefits, you must first register your product at **http://eSupport.3com.com/.**

When you contact 3Com for assistance, please have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision level
- Diagnostic error messages
- Details about recent configuration changes, if applicable.

To send a product directly to 3Com for repair, you must first obtain a return authorization number (RMA). Products sent to 3Com, without authorization numbers clearly marked on the outside of the package, will be returned to the sender unopened, at the sender's expense. If your product is registered and under warranty, you can obtain an RMA number online at **http://eSupport.3com.com/** First time users will need to apply for a user name and password.

These numbers are correct at the time of publication. Find a current directory of support telephone numbers posted on the 3Com web site at:

http://csoweb4.3com.com/contactus/

Country	Telephone Number
Asia, Pacific Rim	
Australia	1 800 678 515
Hong Kong	800 933 486
India	+61 2 9424 5179 or 000800 650 1111
Indonesia	001 803 61009
Japan	00531 616 439 or 03 5977 7991 or 03 5783 1270 (Tokyo)
Malaysia	1800 801 777
New Zealand	0800 446 398
Pakistan	+61 2 9937 5083
Philippines	1235 61 266 2602 or 1800 1 888 9469

(continued)

Country	Telephone Number
P.R. of China	10800 61 00137 or 021 6350 1590 or 00800 0638 3266
Singapore	800 6161 463
S. Korea	080 333 3308
Taiwan	00801 611 261
Thailand	001 800 611 2000

Europe, Middle East, and Africa

From anywhere in these regions, call: +44 (0)1442 435529

You can also obtain support in this region using the following URL:
http://emea.3com.com/support/email.html

From the following countries, you may use the numbers shown:

Austria	0800 293 025
Belgium	0800 78354
Denmark	8088 33 25
Finland	0800 1 18387
France	0800 91 7736
Germany	0800 101 4159
Hungary	06800 14370
Ireland	1 800 509017
Israel	1800 9431983
Italy	800 780557
Luxembourg	800 29727
Netherlands	0800 023 3407
Norway	800 1 0767
Poland	00800 4411 349
Portugal	800 844 029
South Africa	0800 991183
Spain	900 95 8966
Sweden	020 796980
Switzerland	0800 835283
U.K.	0800 085 1816

Latin America

You can obtain support in this region using the following URLs:

Spanish speakers, enter the URL:
http://lat.3com.com/lat/support/form.html

Portuguese speakers, enter the URL:
http://lat.3com.com/br/support/form.html

English speakers in Latin America should send e-mail to:
lat_support_anc@3com.com

Or call using the following numbers:

Antigua	1 800 988 2112
Argentina	0 810 444 3COM

(continued)

Country	Telephone Number
Aruba	1 800 998 2112
Bahamas	1 800 998 2112
Barbados	1 800 998 2112
Belize	52 5 201 0010
Bermuda	1 800 998 2112
Bonaire	1 800 998 2112
Brazil	0800 13 3COM
Cayman	1 800 998 2112
Chile	AT&T +800 998 2112
Colombia	AT&T +800 998 2112
Costa Rica	AT&T +800 998 2112
Curacao	1 800 998 2112
Ecuador	AT&T +800 998 2112
Dominican Republic	AT&T +800 998 2112
Guatemala	AT&T +800 998 2112
Haiti	57 1 657 0888
Honduras	AT&T +800 998 2112
Jamaica	1 800 998 2112
Martinique	571 657 0888
Mexico	01 800 849CARE
Nicaragua	AT&T +800 998 2112
Panama	AT&T +800 998 2112
Paraguay	54 11 4894 1888
Peru	AT&T +800 998 2112
Puerto Rico	1 800 998 2112
Salvador	AT&T +800 998 2112
Trinidad and Tobago	1 800 998 2112
Uruguay	AT&T +800 998 2112
Venezuela	AT&T +800 998 2112
Virgin Islands	57 1 657 0888

North America Telephone Support and Repair
1 847-262-0070

D Regulatory Compliance Information

FCC Class B Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

WARNING: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules, and the Canadian Department of Communications Equipment Standards entitled, "Digital Apparatus," ICES-003.These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one that the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

The Interference Handbook

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

NOTE: In order to maintain compliance with the limits of a Class B digital device, 3Com requires that you use quality interface cables when connecting to this device. Changes or modifications not expressly approved by 3Com could void the user's authority to operate this equipment. Refer to the manual for specifications on cabling types.

FCC Declaration of Conformity

We declare under our sole responsibility that the

Model:	Description:
3CR990B-97	3Com 10/100 Secure Copper NIC
3CR990B-FX-97	3Com 100 Secure Fiber NIC

to which this declaration relates, is in conformity with the following standards or other normative documents:

- ANSI C63.4-1992 Methods of Measurement
- Federal Communications Commission 47 CFR Part 15, subpart B

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MIC Class B Compliance (Korea)

이 기기는 가정용으로 전자파적합등록을 한 기기로서
주거지역에서는 물론 모든 지역에서 사용할 수 있습니다.

Safety Compliance Statement

CAUTION: This device has been tested and certified according to the following safety standards and is intended for use only in Information Technology Equipment which has been tested and certified to these or other equivalent standards:

- UL Standard 60950 / CSA 60950
- IEC 60950
- EN 60950

ATTENTION: Ce dispositif a été testé et certifié selon les normes de sûreté suivantes et est destiné pour l'usage seulement dans le matériel de technologie de l'information qui a été testé et certifié à ces derniers ou d'autres normes équivalentes:

- UL Standard 60950 / CSA 60950
- IEC 60950
- EN 60950